DOCUMENT RESUME

ED 244 121 CE 038 958

TITLE Defense and the Economy: The Issues of Jobs, Inflation, and Longrun Growth. Hearings before the Task Force on Economic Policy and Growth of the Committee on the Budget. House of Representatives, Ninety-Eighth Congress, First Session (December 7 and 9, 1983).

INSTITUTION Congress of the U.S., Washington, D.C. House Committee on the Budget.

PUB DATE Dec 83

NOTE 192p.; Not available in paper copy due to small type.

PUB TYPE Legal/Legislative/Regulatory Materials (090) -- Viewpoints (120)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS Career Education; *Economic Progress; Economics; *Expenditures; Federal Government; Futures (of Society); Hearings; *Inflation (Economics); *Job Development; National Defense; Productivity

IDENTIFIERS *Defense Spending; *Economic Impact

ABSTRACT

This 2-day Congressional hearing on the impact of defense spending on the economy focuses on three aspects of the relationship between expenditures for national defense and the state of the economy: jobs, inflation, and long-run growth. Testimony includes statements, prepared statements, and additional information submitted for the record by individuals representing Data Resources, Inc.; Program Analysis and Evaluation, Department of Defense; Council on Economic Priorities; Department of Industrial Engineering and Operations Research, Columbia University; and Congressional Budget Office. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

CE

DEFENSE AND THE ECONOMY: THE ISSUES OF JOBS, INFLATION, AND LONGRUN GROWTH

ED244121

HEARINGS

BEFORE THE

TASK FORCE ON ECONOMIC POLICY AND GROWTH

OF THE

COMMITTEE ON THE BUDGET
HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

FIRST SESSION

DECEMBER 7 AND 9, 1983

Serial No. TF 6-1

Printed for the use of the Committee on the Budget

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

U.S. GOVERNMENT PRINTING OFFICE
29-794 O WASHINGTON : 1984

CE031958

COMMITTEE ON THE BUDGET

JAMES R. JONES, Oklahoma, *Chairman*

JIM WRIGHT, Texas
STEPHEN J. SOLARZ, New York
TIMOTHY E. WIRTH, Colorado
LEON E. PANETTA, California
RICHARD A. GEPHARDT, Missouri
BILL NELSON, Florida
LES ASPIN, Wisconsin
W. G. (BILL) HEFNER, North Carolina
THOMAS J. DOWNEY, New York
BRIAN J. DONNELLY, Massachusetts
MIKE LOWRY, Washington
BUTLER DERRICK, South Carolina
GEORGE MILLER, California
WILLIAM H. GRAY III, Pennsylvania
PAT WILLIAMS, Montana
GERALDINE A. FERRARO, New York
HOWARD WOLPE, Michigan
MARTIN FROST, Texas
VIC FAZIO, California

DELBERT L. LATTA, Ohio
BUD SHUSTER, Pennsylvania
BILL FRENZEL, Minnesota
JACK KEMP, New York
ED BETHUNE, Arkansas
PHIL GRAMM, Texas
LYNN MARTIN, Illinois
BOBBI FIEDLER, California
WILLIS D. GRADISON, JR., Ohio
TOM LOEFFLER, Texas
CONNIE MACK, Florida

MACE BROIDE, *Executive Director*
JOHN C. DILL, *Deputy Executive Director*
WENDELL BELEW, *Chief Counsel*
JAMES A. CLIFTON, *Minority Staff Director*

TASK FORCE ON ECONOMIC POLICY AND GROWTH

LES ASPIN, Wisconsin, *Chairman*

JAMES R. JONES, Oklahoma
JIM WRIGHT, Texas
STEPHEN J. SOLARZ, New York
WILLIAM H. GRAY III, Pennsylvania
PAT WILLIAMS, Montana
GERALDINE A. FERRARO, New York

DELBERT L. LATTA, Ohio
ED BETHUNE, Arkansas
JACK KEMP, New York

VAN DOORN OOMS, *Chief Economist*
RICHARD CLARK, *Administrator*

CONTENTS

	Page
Hearings held on:	
December 7, 1984	1
December 9, 1984	135
Statement of:	
Brown, George F., Jr., group vice president, Data Resources, Inc	168
Chu, David S. C., Director, Program Analysis and Evaluation, Department of Defense	135
DeGrasse, Robert W., Jr., Council on Economic Priorities and author of "Military Expansion, Economic Decline"	2
Melman, Seymour, professor, Department of Industrial Engineering and Operations Research, Columbia University	72
Penner, Rudolph G., Director, Congressional Budget Office, accompanied by Lawrence R. Forest, analyst, Security and International Affairs Division, CBO	104
Additional information submitted for the record by:	
Brown, George F., Jr., prepared statement	174
Chu, David S. C.:	
Forecasting models	167
Prepared statement	139
DeGrasse, Robert W., Jr., prepared statement with enclosed charts and tables	10
Forest, Lawence R., table submitted, entitled: Share of R&D budget devoted to basic research	129
Melman, Seymour, prepared statement with enclosed article from the New York Times entitled: Looting the Means of Production	82
Penner, Rudolph G.:	
Gross Savings as a Percent of GDP (table)	133
Prepared statement	110

DEFENSE AND THE ECONOMY: THE ISSUES OF JOBS, INFLATION, AND LONGRUN GROWTH

WEDNESDAY, DECEMBER 7, 1983

HOUSE OF REPRESENTATIVES,
TASK FORCE ON ECONOMIC POLICY AND GROWTH,
COMMITTEE ON THE BUDGET,
Washington, D.C.

The task force met, pursuant to notice, at 10:35 a.m. in room 210, Cannon House Office Building, Hon. Les Aspin (chairman of the task force) presiding.

Mr. ASPIN. We would like to welcome you all to the hearings on the impact of defense spending on the economy. There has been, of course, a rather large increase in the commitment of national resources going to defense. It started under the Carter administration but accelerated under the Reagan administration.

During that buildup which covers the 1979 to 1987 time period, defense outlays would increase at an average rate of about 12 percent a year. As a percentage of gross national product, defense spending would go from 5 percent to 7.7 percent, which is a greater increase than over the Vietnam buildup from 1965 to 1968, although the present buildup is being done over a longer period.

But the buildup that we are talking about here is particularly pronounced in the area of procurement. The buildup for Vietnam and for Korea was across the board in personnel and in areas related to personnel. The buildup of the Reagan administration is very heavily concentrated in procurement. Procurement outlays would increase at an average rate of about 20 percent over the 1982 to 1987 period.

The speed, magnitude, and timing of the buildup have raised concerns over potential impacts on the economy of such a commitment of resources. It has also revived a more general debate about long-term effects on the mature industrial economy of a large and rapidly growing defense sector.

These hearings will focus on three aspects of the relationship between expenditures for national defense and the state of the economy. First, the issue of jobs. Does defense spending create as many jobs—direct, indirect, and induced—as an equivalent amount of spending on other Government programs or of tax reductions? Are there any significant differences in the types of jobs created or their timing?

Second, the issue of inflation. Is the current buildup in defense spending likely to lead to increases in the future rate of inflation or in the prices of defense goods and services? If such increases are

( ) 5

likely, should they be attributed to the pace of the buildup, shift in the composition of GNP or other factors?

Third, and probably most complicated, the issue of longrun growth. What consequences will the current buildup in defense spending have for productivity and longrun growth in the American economy? How will a shift in resources from civilian to military research and development affect the technological competitiveness of the economy?

Our first witness this morning is Robert DeGrasse, who is from the Council on Economic Priorities. He is going to present a paper or opening testimony to us this morning, then we will get to some questions.

Why don't you start. We would like to hear your testimony and then we can talk about it.

STATEMENT OF ROBERT W. DeGRASSE, JR., COUNCIL ON ECONOMIC PRIORITIES AND AUTHOR OF "MILITARY EXPANSION, ECONOMIC DECLINE"

Mr. DEGRASSE. Thank you, Mr. Chairman.

I appreciate the opportunity to testify this morning before the committee. My name is Robert DeGrasse. I am on leave from the Council on Economic Priorities. Right now I am playing hooky from the Kennedy School of Government at Harvard where I am currently studying.

What I would like to do this morning is to turn around the three questions that you have asked to look at the issue of longrun growth potential and its problems—problems created by increased military spending; and then touch only lightly on the issues of inflation and employment.

Those issues are covered more thoroughly in the book that I think we have provided you a copy of, "Military Expansion, Economic Decline."

I think before starting one has to have at least two caveats in discussing this issue of military spending and the economy. I think first of all the most important point is that the effect that military spending has on the economy should not be the overriding variable in determining what level of defense spending is necessary for the security of our Nation. While there are tradeoffs and while there are costs associated with military spending, we cannot look at this as somehow a prescription for policy for reducing military spending or increasing it depending on your view of the effect of military spending on the economy.

Indeed we can afford any amount of spending on the military we might want to undertake. During the Second World War, 42 percent of the GNP was devoted to military spending and we did that through a series of allocation controls on the economy, wage and price controls. As a result we were able to over a 5-year period afford to devote a significant share of our economy to defense.

Thus we cannot say that there is reason to believe we cannot in some way afford military spending. The penalty in this context is whether or not we want to look at ways of trying to control the economy, control the effects of the buildup we are talking about.

What I would like to do is to try to walk through the analysis of military's effect on the economy that we performed at the Council on Economic Priorities over the last 3½ years. I think the issue that we tried to address was whether or not this increase in military spending was going to have an adverse effect on our international competitiveness, and the ability of the economy to create jobs over the next 5 years.

We approached that issue from the perspective of what sorts of effects has military spending had during the cold war? That is, since 1950 when we dramatically increased military spending and have seen it take up a significant portion of the gross national product anywhere between 15 and 6 percent, 4.5 percent in the late 1970's. What effects that spending has had on the economy over the period of time during the cold war.

We did this by trying to compare U.S. economic performance with the performance of other Western industrialized nations, nations that have somewhat similar characteristics in terms of their political economy to the United States.

We felt that by looking at 17 nations that we would be able to create somewhat of a laboratory for trying to compare the effects of military spending here versus in other nations. From time to time I am going to indicate certain charts in the testimony that I have that would elucidate the points I am making.

The first chart is chart 2 which indicates the levels of military spending in the United States and the other nations we looked at over the 20-year period between 1960 and 1980.

That chart indicates that military spending as a percentage of GNP in the United States was about 7 percent, actually this is gross domestic product. It is a better indicator for international comparisons, basically the same though as GNP.

It indicates that the United States was clearly the nation with the highest percentage level of military spending amongst the 17 nations we were looking at.

What we did was to test the hypothesis that there is a relationship between higher military spending and poorer economic performance. In doing a statistical analysis we found that there is a strong relationship between higher levels of military spending in that period and lower levels of gross fixed investment. Here I point to chart 8 which indicates there is a relationship between those two variables.

That relationship exists when you adjust for a variety of other factors as well, when you adjust for the level of economic growth, the maturity of an economy under the assumption that more mature economies tend to grow slowly. We thought this would be the descriptive variable.

And we found that even after adjusting for those variables and for others that this relationship between higher military spending and lower levels of gross fixed investment does seem to hold up.

There is also a somewhat weaker relationship between military spending and productivity growth. It was a fairly strong relationship in the 1960's and the relationship becomes somewhat weaker in the 1970's because of the fact that it is harder to figure out why we have had productivity problems in the 1970's.

But overall the point that we think that is made by this sort of an analysis is that there seems to be a clear indication that there is somewhat of a penalty for higher military spending. Now the question is what is the magnitude of that penalty. The statistical tests we used are of a general sort. We don't feel comfortable trying to attach a specific number because of the fact that you only have 17 nations to compare to. There are a number of problems there. But the basic point we believe made by this data is that there seems to be an indication of a certain penalty that is paid in terms of investment.

It only stands to reason as well if you increase military spending some other portion of the GNP should have to decline either consumption, investment, or other Government spending, and indeed that seems to be indicated cross-nationally that the real burden comes in the area of investment rather than in the areas of Government spending or consumption. That may just reflect political realities. Maybe it is harder to cut consumption and Government spending than it is to cut investment. It is easier to raise interest rates and make investment less attractive and it is harder to get people to cut current consumption or as I am sure the Budget Committee recognizes, Government spending.

So lower investment seems to be the penalty that we often pay. Now certainly one thing that you might want to gather from this is that one of the goals of budgetmaking during a period of high military spending would be to try to find a way to tax consumption rather than investment. That would be one way to somewhat reduce the penalty paid by increasing military spending.

Why is it that we also come up with a relationship with this issue of productivity growth as well, the growth in the efficiency of the labor force in the economy? To develop a theory to support the statistical data one has to move beyond simply looking at shares of GNP shifted around or assuming that by reducing investment that that will be the only factor that has an effect on productivity growth.

We have to look at the effect of military spending on technology. This is the second issue in terms of the overall effect of military spending on growth I would like to focus on.

Military spending has often been said to have a beneficial effect for civilian technology, that there will be spinoffs as a result of high levels of military spending. Indeed, many argue that defense spending is used for the types of basic research and development that will have or might have broad application to the civilian sector eventually.

I would like to point out that in this regard only about 3 percent of the Defense Department's research and development efforts have been oriented toward basic research over the last two decades. In absolute dollar numbers that is less than the amount of money that three other Government departments spend less money on basic research and development, including the National Science Foundation, the Health and Human Services Department, and NASA. All three of those agencies spend more dollars in real terms on basic research than does the military.

Certainly though the military spends the lion's share of the Federal research and development dollar and indeed we spend—we

have spent anywhere between 75 and 50 percent of research and development dollars on the military during the cold war period. Currently it is around the 50 percent figure, which when we look at the total amount of R&D sources in the economy. Since the Government spends about 50 percent of the total R&D dollars and since the Government spends about 50 percent of its amount on the military, anywhere between 25 and 30 percent of the Nation's total research and development funds are devoted to military spending.

In addition to research and development, it is important to recognize that the Defense Department also uses high technology resources through the procurement budget. Indeed if you look at the procurement budget as a share of durable goods production in the economy you find that during the last 20 years it was as high as about 16 or 17 percent of durable goods production and more recently as low as 10 percent of durable goods production.

That is much larger, almost twice as much as the amount spent on defense in the economy as a whole, indicating that we have a much more significant impact in that specific sector, durable goods, and in using manufacturing resources through defense uses than in the overall economy.

So we see two pictures here: That we use a significant amount of R&D funds; that we use a significant amount of our durable goods production capability for military purposes. As a result the amount of labor devoted to those particular purposes is rather significant.

In fact we believe that about 20 to 30 percent of the Nation's scientists and engineers are working on defense-related projects. I believe that is a very significant amount of the Nation's productive talent.

It means that an important group of people is unavailable to be working on efforts which could increase the productivity of the civilian economy. As a result, I believe that that is one of the ways in which military spending tends to reduce our ability to increase our productivity growth in this country.

One might say that all of this research and development has a positive effect on the civilian economy—coming back to the spinoffs argument. But the question is if we are spending all this money on the military, and it is having a positive effect on spinoffs, you would think that the sectors most closely allied with the military would be in reasonably good shape in the international arena, that is those industries would be garnerning a number of technological innovations from the work done on the military and they would be able to apply those quickly to the civilian sector and be able to maintain their competitive position at least vis-a-vis firms in other nations working in the same area.

But I think we can see from three specific industries, the electronics industry, machine tool industry, and the aircraft industry, that that in fact is not happening. In the aircraft industry we see that the U.S. market for commercial aircraft is being whittled away in two areas, one is in large transport aircraft through Airbus Industries, and the other area we are seeing whittling away is in the area of smaller commuter aircraft. Beach and Cessna, while they don't have as much military contracting you would think they would be able to use some of the technology in the area.

Those firms are not able to capture probably the largest growing part of the aircraft industry in the United States.

In machine tools, we see the United States unable to keep up with the Japanese in numerically controlled machining centers and other new technologies. I think this is, to some extent, unexpected given the fact that the military is spending an awful lot of money on manufacturing technology programs and should indeed be having some effect on our ability to compete in the civilian sector. If that was true, we would be in a better position.

Unfortunately, I would have to say that I agree with Simon Ramos—one of the founders of the TRW Corp.—who indicated that military spending does not seem to provide as much technological advancement per dollar than if the money were spent directly in the civilian sector; and indeed he thinks that that is part of the reason we have had poor productivity growth.

The final area is the electronics sector, which we are probably most familiar with and read the most about in the papers. Here you have probably been following stories about the video cassette recorders and other technologies in the consumer area in which the Japanese seem to be doing well. We thought radios were a thing of the past until Sony introduced the Walkman. And even though a U.S. firm, Ampex, was the first to develop videotape recorder technology, the Japanese were the first to be able to cost engineer that technology for civilian applications.

Probably the most celebrated case has been in the area of memory chips, 64K RAMs, random access memories, and in that area we are seeing for a variety of different reasons the Japanese being able to compete with us quite successfully in an area of high technology production.

The point here is that while it is not clear that there is a direct connection, we would hypothesize that if we are spending a significant amount in each industry on the military, and if they are being subsidized by the military in production, and R&D is taking place in each area, the spinoffs should be providing us with some benefit that could be translated in the civilian sector. I am not sure we can say that that is occurring, however.

Finally, in regard to this issue of long-term economic growth, we really have a choice facing us as a nation, as I see it. The choice is whether or not we want to watch our international competitiveness decline as a result of substantially increasing the share of major industries in our economy that we devote to the military; whether or not we want to see our international competitiveness decline, or whether or not we believe there is some way, either to decrease our defense spending or encourage our allies to substantially increase their defense spending and divert resources they would be using for civilian purposes to the military. Indeed, I think that is probably as close as one could get to a policy implication of the problems with the long-term economic effects of military spending.

I would like to turn briefly to the issue of inflation, and then jobs. Inflation is an area that we see some of the specific impacts of substantially increasing our military spending.

As we are all aware, I believe, the military economy, the industries serving the military sustained very rather significant problems both in inflation and in backlogs during the 1978 to 1980

period where defense spending began to turn up, and there was also substantial expansion in the civilian sector, both in the aircraft industry and the electronics industry.

As a result of the congruence of growth in both the military and the civilian parts of these industries, we saw significant backlog problems and inflation develop in the latter 1970's and beginning of the 1980's. Those backlog problems were caused in part because of the fact we don't have as many supplier firms supplying the military as there were in the past due to the contraction in parts of the production base that occurred as a result of the reductions after the Vietnam war.

Those problems have not been relieved. There has not been, in my view, a substantial increase in the capacity for production of defense goods. And, as a result, even though we have been able to solve this problem in the short run through a very, very severe recession, the fact is that now we are seeing economic growth return more vigorously than many had predicted; and, as a result, I believe we are going to see some of these same problems occur fairly soon.

Now, I am sure that you will hear from DRI and CBO more accurate estimates than what I can provide you. But I do believe that here is an area where there are going to be problems.

There are already significant increases in the leadtimes in the electronics industry, particularly for integrated circuits and semiconductors. The electronics industry has come back a little bit stronger than the aircraft industry to this point. As a result, you already are seeing some stories about the shortages of semiconductors. The IBM personal computer has done much better than expected. And, as a result, it is hard to find the logic chips that that IBM PC requires. So we are going to see a tightness in supply of the product in the semiconductor area.

In other areas, it seems for the moment at least, leadtimes are still not a problem, and my off-the-cuff estimate is that we won't see significant leadtime problems until at least the latter part of 1984. Probably into 1985 or 1986 is where you will begin to see leadtime and inflation problems begin to settle back into the defense industry.

More broadly, in regard to military spending and inflation, the point I would like to make is that, per se, other than affecting markets specifically oriented toward defense goods, there is no reason to believe that military spending is inflationary. Military spending does, as I just mentioned, affect specific marketplaces, and in those industries tightness in supply could lead to inflation in the economy as a whole, yes. And, as a result, many times during substantial buildups for wars when you get a tremendous demand for manpower and for productive capacity, you see a blip in the inflation rate.

Indeed, that is directly due to military spending. This can be controlled if you are willing to institute controls. Those problems can be reduced, as we saw during the Korean war. But the real question is: What does the executive and the Congress do offset the increase in defense spending? This is where, clearly, the question arises as to what the inflationary impact of a rise in defense spending will be.

We have seen during this particular buildup we have chosen to pay for it by increasing the borrowing we do from society, and by reducing taxes and attempting to some extent to reduce civilian expenditures. That has not been very successful, as you recognize, and as a result, borrowing has been the major way of paying for this buildup. And as we all know from reading the papers and watching the problems that the Chairman of the Council of Economic Advisers is presently having, it is a rather difficult dilemma we face, and I am not sure I need to say much about deficits, and I know there has been enough ink spilled over that issue already.

Turning finally to this issue of military spending and employment, here again at the broadest level, if we look at the macroeconomic effects of military spending, if you spend $1 billion on one area of the economy versus $1 billion in another area, if you are looking at the short-term macroeconomic effects of military spending, there really is very little difference in the total number of jobs. In other words, if you spend $1 billion in mass transit production versus $1 billion in military spending, the direct jobs, indirect jobs and induced jobs created are going to be about the same.

The question is really in the distribution of those types of employment, both geographically and in terms of what industries and what particular professions within the industries are affected. I would like to focus on that issue for a moment and first define terms.

Direct jobs are those jobs created in a specific industry by the expenditure of money in that industry. In other words, if you spend money on aircraft, the amount of jobs created directly in the aircraft industry is the amount of jobs we are talking about when we talk about direct employment. That is pretty straightforward.

Indirect employment is the employment created in supply industries. The aircraft industry, obviously, needs some forgings, needs semiconductors and a variety of other goods and services that are required to build aircraft, for example. Those are the indirect jobs that are created in the supply industries.

Induced employment is the employment created by the spending of the employees, both in the direct and indirect areas. In other words, if you have a skilled machinist working for Boeing in Seattle, the spending that that employee does for cars, for education, for housing, for food, all create employment. And, as a result, he or she is inducing employment in the rest of the economy.

Focusing specifically on direct and indirect employment, which has been the focus of this debate up to now, there are significant differences between the total amount of jobs created. Military spending tends to create fewer jobs than other industries in direct and indirect employment. My belief is that this occurs primarily because the defense industry is what I would refer to as a craft industry as opposed to—many people believe military spending is capital intensive. I believe there are few incentives for defense contractors to expand investment and to make their production process more efficient.

In fact, there are some very substantial incentives to increase costs; and, as a result, there is no particular reason why a defense manufacturer will want to make his production process more effi-

cient. And, as a result, there is very little new investment that occurs in the defense industry.

Indeed, there are incentives to carry a very substantial amount of overhead costs both in terms of design engineers, people who are able to put together proposals for the Defense Department—and, as a result, that overhead cost, that substantial cost for labor, is the defining characteristic of the defense industry.

The question here is one of the cost of the labor versus the cost of the capital equipment. I think clearly, the defense industry is a labor-intensive industry just in terms of the amount of money spent on labor. The amount of money spent on labor is high. But the salaries that are paid are higher than you find in other industries in the economy. The amount of people directly employed is smaller. The example I would like to give here is that of the missile industry. It is the most dramatic example.

There are defense industries that are closer to the average in the economy. But to give an indication of the breakdown in the defense industry between professional and technical workers and just one other category, operatives, the machine operators—they are the semiskilled workers as opposed to craft workers—you see a dramatic difference.

In the missile industry, about 56 percent of employment is in the professional and technical categories, which includes engineers. In the economy as a whole, only 9 percent of a manufacturing firm on the average is made up of professional and technical workers. I think the difference is rather stark—56 percent versus 9 percent.

In the operative area, there is also a very stark distinction. In all manufacturing, the bulk of the jobs created in that category, 43 percent of the employment comes in the operative category. Whereas, in the missile industry, only about 11 percent of the employment is created in the operative area.

So what you see is an industry that is highly oriented toward professional and technical workers, and indeed as a result requires a significant amount of money, because the salaries for professional and technical workers are significantly higher than operatives; and, as a result, in this direct and indirect comparison we tend to create fewer jobs than in other industries.

Just a side note here, if we expand military spending, and if the spending is going to procurement, and if we are spending an awful lot in missiles and in aircraft, the query is: How are all these industries going to be able to garner the amount of professional and technical employees they need without squeezing out some of the requirements of the civilian sector here?

I think there is a big issue as to whether or not we will have an ample supply of engineers and scientists to man the factories, both in the civilian and defense sectors of the economy. And, indeed, this is an area where it is a lot harder to add new capacity. If you need new capacity in a semiconductor plant, you can go out and purchase new capital equipment. It is much harder to expand the supply of scientists and engineers in the short run because it is a training process that requires a few years of work at the university.

That concludes the summary of the work we performed at the council and I await any questions you may have.

[Testimony resumes on p. 62.]
[The prepared statement of Mr. DeGrasse follows:]

PREPARED STATEMENT OF ROBERT W. DEGRASSE, JR.

MILITARY SPENDING: STIMULANT OR IMPEDIMENT?

By Robert W. DeGrasse Jr.*

> ...our research suggests that [military expenditures] are beneficial in the long term to the civilian economy, since much of the additional spending promotes domestic production in our most capital and technology intensive sectors.
>
> Secretary of Defense Harold Brown, testimony before the U.S. Senate Budget Committee, February 27, 1980

I. INTRODUCTION

Numerous advocates of higher military budgets have long asserted that Pentagon spending is a good way to stimulate the economy. Government officials and industry leaders promoted this theory during key debates over defense policy during the 1950s and 1960s. [1] More recently, Secretaries of Defense Harold Brown and Caspar Weinberger have made similar claims. [2]

This position departs, however, from the historical main stream of economic thought. Military spending has been generally viewed as an impediment to economic progress. Since soldiers and arms producers do not create goods and services that can be consumed by others, many economists see arms spending as subtracting from a nation's total resources. If the "dead weight" of military spending becomes too great, it is assumed that an economy will suffer. The first economist, Adam Smith, presented this position in his famous book, The Wealth of Nations:

---

* Author of Military Expansion, Economic Decline (Council on Economic Priorities, 1983), from which this paper was adapted. He gratefully acknowledges the research assistance of Elizabeth McGuinness and William Ragen.

> [T]he whole army and navy, are unproductive labourers. They are the servants of the public, and are maintained by a part of the annual produce of the industry of other people. Their service, how honorable, how useful, or how necessary soever, produces nothing for which an equal quantity of services can afterwards be procured. [3]

That traditional view was widely held in the United States before World War II. Even after the war, government officials voiced concern about the untoward economic effects of higher military spending. Presidents Truman and Eisenhower, for example, both cited economic dangers as a factor in their decisions to limit arms spending increases. [4]

Despite the traditional view, the economic prosperity created by World War II left a deep impression on the American people. Before the war, the United States was mired in the Great Depression. Unemployment, which had been as high as 24.9 percent in 1933, still averaged 14.6 percent in 1940. During the war, unemployment dropped rapidly. In 1942 it averaged 4.7 percent and in 1944 unemployment reached a wartime low of 1.2 percent. [5] As a result, the images of "Rosie the riveter" and America as the "arsenal of democracy" stayed with Americans long after the Second World War was over.

While those memories still enhance support for heavy military spending, there has been little assessment of the effect that high arms expenditures have had on the U.S. economy during the Cold War. Did high levels of military spending result in better economic performance? Or has military spending contributed to our present economic problems? The Council on Economic Priorities has examined these questions during the past two years in the context of our nation's current economic difficulties.

II. CURRENT ECONOMIC CRISIS

Since World War II, Americans have come to expect that our standard of living would increase indefinitely. During the 1950s and especially the 1960s, the future promised greater opportunity and prosperity, even though we already enjoyed the world's highest per capita income. In the 1970s, however, the "American dream" began to crumble under the weight of an economy plagued by inflation, unemployment and slow growth.

"Stagflation" during the 1970s eroded the yearly increase in real income that Americans had come to expect. From 1960 to 1973, the yearly increase in per capita disposable personal income averaged 2.8 percent after accounting for inflation. Between 1973 and 1981, however, the average increase was only 1.6 percent. Production and non-supervisory workers fared worse. Instead of increasing, their hourly earnings actually fell 1.6 percent a year, between 1973 and 1980, after rising 1.5 percent a year from 1960 to 1973. [6]

During the past decade, unemployment has continued its post-World War II trend — remaining at a higher level after each recession than it was prior to the downturn. In December 1982, unemployment reached a level unmatched since the Great Depression — 10.8 percent. [7] Few economists expect it to fall below 9 percent until 1984. Even though unemployment in other industrial nations also rose after the oil crisis, America's unemployment rate remained higher than most. [8]

Economic growth in the United States has also been sluggish. America's average inflation-adjusted rate of growth in gross domestic product (GDP)* since

* Gross domestic product (GDP) is preferred to gross national product (GNP) for international comparisons.

1960 ranks 13 among 17 major non-communist nations. [9] As a result of stronger economic growth, eight European nations surpassed America's standard of living by 1980, as measured by the level of GDP per capita. [10] Throughout most of the 1970s, Switzerland, Denmark and Sweden all enjoyed a higher level of GDP per capita. By the end of the decade Germany, Norway, Belgium, the Netherlands and France also passed the United States.

A growing number of economists place a large measure of blame for our economic problems on the declining competitiveness of U.S. manufactured goods in both foreign and domestic markets. "U.S. industry's loss of competitiveness over the past two decades has been nothing short of an economic disaster and goes a long way toward explaining the shrinking standard of living," explained Business Week in a special issue entitled the "Reindustrialization of America." [11] During the past decade, American manufacturers have lost almost a quarter of their share of the international market and about three percent of their share of domestic manufacturing sales. These declines cost the American economy some $125 billion in lost production and at least 2 million industrial jobs. The nation's reduced manufacturing competitiveness occurred even after a 40 percent devaluation of the dollar during the 1970s that made foreign goods more expensive, and American goods cheaper, in the international market. [12]

At the same time American manufacturers were losing ground to foreign competition, the rising cost of imported oil and other raw materials made the expansion of exports an urgent task. Before the mid-1970s, America's positive balance of trade in manufactured goods always exceeded any negative balance in fuels and crude materials. But since the oil crisis began, net exports of manufactured goods have offset the increasingly negative balance in raw materials during only one year, 1975 (Table 1).

29-794 O—84——2

The balance of trade in manufactured goods alone was negative in two of the nine years between 1973 and 1981. In the other years, exports of manufactured goods were less than 20 percent greater than imports of such goods (Chart 1). By comparison, during the 1960s, such exports were over 30 percent greater than imports in all but the last two years of that decade.

These statistics indicate a serious relative deterioration of U.S. manufacturing competence. As the most advanced industrial nation in the world during most of the last three decades, a wealth of skilled labor, capital and advanced technology should have enabled American firms to produce quality goods at competitive prices. This, however, did not occur. Japanese and European manufacturers are capturing larger and larger shares of U.S. domestic markets, and are displacing American goods in markets abroad.

The explosion in energy prices significantly contributed to the problems facing U.S. manufacturers by making energy-intensive production techniques more expensive, and thus, less competitive. In addition, manufacturers were forced to use resources, such as engineers and investment capital, to increase energy-efficiency. As a result, product development and improvement suffered. The energy crisis, however, is not the only reason for the lagging fortunes of America's manufacturing industries. A steep decline in the ratio of manufactured exports to imports began in the mid-1960s, years before the dramatic rise in oil prices in 1973 (Chart 1). Moreover, other advanced industrial nations were able to offset increased energy prices by expanding the export of manufactured goods. [13]

A variety of other factors has been cited to explain the declining competitiveness of U.S. manufacturers. Some observers believe that increased social spending

and expanded government regulations have reduced the amount of new investments made by American firms. [14] Others have argued that lower labor costs have provided our competitors with a key advantage. [15] More recently, some analysts have pointed to shortsighted management techniques employed by major American firms as a reason for our decline. [16] Still others have suggested that industrialization in the United States has proceeded sufficiently to exhaust most of the profitable opportunities in old-line industries, such as autos and steel. [17] Only a few analysts have examined the possibility that military spending has been a major contributor to declining fortunes in the manufacturing sector. [18]

Our study concentrated on examining the last thesis. Although not the only reason for our economic woes, arms expenditures employed key resources, such as engineers and investment capital, that might have been used to modernize U.S. manufacturing industries. While America's manufacturing firms were becoming less competitive, the United States spent more on arms than all of our NATO (North Atlantic Treaty Organization) allies combined. Even after adjusting for the relative size of each economy, America's military burden was by far the heaviest among major industrialized nations (Chart 2). Over the past two decades, America spent 35 percent more of its GDP on the military than did the United Kingdom, which had the second largest military burden. At the other extreme, in relative terms, Japan spent only about one-seventh as much as did the United States.

III. STATISTICAL ANALYSIS

We explored the assertion that military spending has contributed to America's declining competitiveness by comparing the national economic performance of 17 major non-communist, industrial countries over the past two decades. We though that patterns in the performance of these industrial nations might help explain why some

were more successful than others.

Our analysis was performed in three parts. First, we identified factors that were associated with better economic performance. In particular, we tested the hypothesis that greater investment and faster productivity growth resulted in stronger economic growth and less unemployment and inflation. Second, we examined the hypothesis that among comparable nations, those with heavier military burdens suffered poorer economic performance. We also examined four competing hypotheses drawn from the current economic literature:

1. Greater government spending reduced investment and performance.
2. Higher labor costs decreased the competitiveness of American manufactured goods.
3. The baby boom of the 1950s slowed the growth of capital per worker in U.S. manufacturing.
4. More heavily industrialized nations tended to grow slower than less industrialized ones.

Finally, we examined the relationships among the various factors that might have inhibited performance to see if any of our results could be explained by disguised correlations.

Three factors were considered in choosing countries for our study. Each filtered out differences among nations that could have invalidated our results. First, we excluded those nations in which market mechanisms do not largely determine the distribution of economic resources. Second, we excluded nations that do not have large and diverse industrial capabilities. Third, we excluded nations for which we could not obtain data consistent with the majority of other countries in the study. The nations meeting all three criteria were: Australia, Austria, Belgium, Canada, Denmark, Finland, France, West Germany, Italy, Japan, the Netherlands, New Zealand,

Norway, Sweden, Switzerland, the United Kingdom, and the United States. From the outset, we recognize that our sample contains nations with significant differences in social customs and economic history. These differences do not invalidate the study if our findings are interpreted carefully.

We averaged a variety of economic indicators for each of the 17 countries over the period 1960 to 1980. The data were also divided in two sub-periods (1960 to 1973 and 1973 to 1980) to detect any changes likely to be caused by either expanding energy prices or by lower levels of military spending after the Vietnam war.

Three statistical tests were used to detect associations between variables. First we used simple rank order correlations to catch basic relationships. Then we excluded individual nations, like Japan and the United States, to see whether any one country was primarily responsible for the correlations we found. Finally, we performed multiple regressions on the data to determine which variable, or combination of variables, best explained the trends. The results of those tests suggest that the relationships discussed below do indeed exist. However, it is important to bear in mind that statistical analyses only indicate that relationships exist, they do not explain why such relationships occur.

A. Reasons for Economic Success. From the outset, we postulated that a large measure of America's decline has resulted from the failure of U.S. manufacturers to keep pace with the rapid growth in productivity maintained by Western European and Japanese firms during the past two decades (Chart 3). Between 1960 and the oil price shock in 1973, manufacturing productivity growth in most European nations (except the United Kingdom) averaged twice the U.S. rate. Japan's growth rate was

more than three times higher than America's. Even after the oil crunch depressed economic growth in most of the industrialized world, many European countries and Japan still maintained productivity growth rates two to three times higher than the U.S. rate.

Faster growth in output per worker has provided other countries with a significant advantage: They could decrease the price of their goods or offset inflation more easily than could American firms. Ever since Eli Whitney discovered that interchangable parts made the production and repair of rifles cheaper, the genius of U.S. industry has been its ability to reduce the cost of manufactured goods — making them affordable for most people. Long before the majority of Europeans could buy automobiles, Henry Ford's assembly line produced Model T's affordable to the average American worker. Ford's concept was copied and vastly improved upon by firms in a wide variety of industries throughout the world. Each refinement has been aimed at reducing costs to capture a larger market share. For decades, U.S. firms were unmatched in their manufacturing efficiency. Yet today, many European companies have closed the gap and are now beating us at our own game.

In our analysis, then, we looked to see if nations with faster increases in productivity enjoyed better economic performance during the last two decades. Our statistical tests indicate that productivity growth was closely associated with real economic growth before 1973, although this relationship deteriorates after the dramatic rise in oil prices. We also found that nations with higher growth in manufacturing productivity tended to have lower unemployment. The probable link here is that increased productivity lowers costs and expands the demand for a product, increasing production and employment. Surprisingly, this relationship is stronger after the oil crisis began than it was during the 1960s. Both of these findings underline the importance of a strong manufacturing sector to the overall

performance of a nation's economy.

Why have other nations been able to sustain higher productivity growth? Increased manufacturing efficiency can be attained by a number of methods, the most important being: 1) replacing older machines with more sophisticated equipment; 2) expanding factory size to take advantage of economies of scale; 3) increasing the skill and competence of the work force; 4) adopting more efficient methods for using people and machines; 5) replacing expensive materials with cheaper substitutes; and 6) developing new, more attractive products. Four of these methods -- expanding factory, purchasing new production equipment, substituting materials and creating new products -- require additional investment. In other words, without available investment capital important ways to attain productivity growth are cut off.

Our statistical analysis suggests that investment has been a key factor in productivity growth. Before the oil crisis, productivity growth tended to be faster in nations with higher investment levels. The United States ranked last in productivity growth between 1960 and 1973 and also last in both the share of GDP devoted to new fixed investment and the growth in total manufacturing capital during that period (Charts 4 and 5). After the onset of the energy crisis, however, our statistical evidence does not indicate that higher investment resulted in faster productivity growth.

New investment also seems to have stimulated economic growth and reduced unemployment. Nations with a larger share of GDP devoted to investment and/or higher growth in total manufacturing capital also tended to have faster real growth in GDP. This relationship remained strong even after the oil crisis began. Furthermore, nations that invested more heavily experienced less unemployment. While this link between investment and lower unemployment is strong prior to the

oil crisis, it disappears after 1973.

Initially, we were confused by the differences in our findings for the periods before and after the oil crisis. We were puzzled to find that after 1973, productivity growth did not correlate with investment. Upon reflection, however, these results might be explained by two factors. First, the dramatic boost in oil prices, which made a number of production techniques unprofitable, forced many firms to increase their energy-efficiency. But new investments in energy-efficient plants and equipment did not necessarily increase labor efficiency. Second, firms in nations that had more energy-efficient capital equipment prior to the oil crisis probably did not have to invest as heavily to increase labor productivity as did companies in countries with less energy-efficient equipment. For example, in North America energy prices were controlled during the 1960s, reducing the need for energy-efficient equipment in that period. Thus, even though Canada invested heavily after the oil crisis began, that country experienced the lowest level of productivity growth among the nations we studied. On the other hand, in northern Europe, where energy prices were high during the 1960s, Belgium, Denmark, and the Netherlands all had high productivity growth after 1973 even though their investments were low.

After energy prices rose dramatically, nations with either higher investment or faster productivity growth generally experienced better economic performance. Countries like Canada, which had higher investment after the energy crisis began, tended to have better economic growth. Nations in northern Europe, which had larger productivity increases usually enjoyed lower unemployment. Moreover, nations, such as Japan and France, which had both higher investment and greater productivity increases, had faster overall growth and lower unemployment. Nations such as the United States and the United Kingdom, which had low investment and low produc-

tivity growth, suffered from slow growth and high unemployment.

Inflation was the only performance measure that did not correlate with either investment or productivity growth. While increases in a nation's inflation rate can be particularly detrimental to investment, we found no cross-national association between higher inflation and lower investment. Indeed, while Americans invested less compared with most other industrialized nations, the United States enjoyed one of the lowest inflation rates, even after the energy crisis began. [19] Another unexpected finding was that lower unemployment did not correlate with higher economic growth. That overturned our expectation that nations experiencing faster growth would tend to enjoy lower unemployment.

In summary, the measures of investment we used were strongly associated with economic growth in each of the data periods we tested. Investment was also linked to productivity growth and lower unemployment, except after the oil crisis. Ironically, while the association between productivity growth and economic growth disappeared in the post-oil crisis data, the link between higher productivity growth and lower unemployment became stronger in that period. Inflation was not linked with investment or productivity growth, and higher economic growth was not associated with lower unemployment.

B. Reasons for Poorer Performance. Having broadly sketched in the hallmarks of economic success, we look in this section for economic pitfalls that may cause poor performance. In particular, why were investment and productivity growth lower in some nations than in others? To help answer this question, we analyzed five different factors that might explain poorer economic performance: the civilian government burden; labor costs; growth in the labor force; industrial maturity; and the

military burden.

1. Growth in Civilian Government: Examining cross-national data on government spending, we found virtually no evidence for the often-repeated claim that government social programs, particularly transfer payments, have contributed to America's declining competitiveness. The burdens imposed on most western European nations by non-military government expenditures far exceed the burden they impose on the United States (Chart 6). The United States ranked 13 among 17 industrial nations in the share of GDP consumed by civilian government. America also ranked second to last among 14 nations in the share of GDP transferred by the government from one group to another through programs such as social security. [20]

Our statistical tests did not uncover any significant evidence that relative levels of civilian government spending or transfer payments had any relationship to economic performance among advanced industrial nations. Of the numerous comparisons between social spending and measures of economic performance over three time periods, none showed any strong negative association. On the contrary, some evidence indicates government spending actually improves national economic performance. [21] Government expenditures that improve the economic infrastructure, such as roads, bridges and mass transit, seem to enhance economic growth.

2. Higher Labor Costs: Although some believe that cheap labor explains the success of our industrial competitors, pay increases abroad have rendered this argument obsolete. Low wages helped some countries during the 1960s; but by the mid-1970s, European manufacturing labor costs had caught up to American costs. By 1975, Belgium, Sweden and the Netherlands surpassed America's absolute level of compensation per hour in manufacturing (Table 2). By 1980, compensation to workers in West Germany also exceeded America's. France, Canada and Italy are close

behind. Japan, however, continues to have lower labor costs than other industrial nations.

We did find weak evidence, limited to the 1960s, that nations with higher manufacturing labor costs corresponded to those with three areas of lower growth -- in productivity, total manufacturing capital and overall GDP. Yet as compensation rates among nations converged during the 1970s, these associations disappeared. More importantly, we found strong evidence that nations with higher labor costs offset this disadvantage by maintaining higher output per employee. This was particularly true for the United States, which had high labor costs and the highest level of output per employed person throughout the entire period (Table 3).

Higher productivity growth abroad seems to have helped close the wage gap between American workers and their foreign counterparts. Besides allowing firms to expand their markets by decreasing the prices of their products, growth in output per employee also brings worker demands for a share of the rewards. Labor unions throughout the world have often tied wage demands to productivity growth. Thus it comes as no surprise that our statistical analysis uncovered a strong positive relationship between productivity growth and labor cost increases. Compensation increases were also linked to the inflation rate; however, it is still not clear if labor cost increases trigger inflation or if higher prices encourage higher wage demands.

3. Booming Labor Force: We do not dispute that the expansion of America's work force during the past few years has combined with sluggish growth of investment to result in slower growth of the overall capital to labor ratio. [22] To use this fact to explain why our manufacturing productivity growth and international competitiveness have declined during the past decade, however, would be erroneous since

most of the new jobs created in our economy were in the service sector. [24]

In the manufacturing sector, employment actually grew more slowly during the last few years than it did between 1960 and 1973. At the same time, growth in total manufacturing capital remained relatively stable. Thus, the growth in the ratio of capital to labor was higher during the present period than in the earlier period (Table 4). While growth in the capital to labor ratio declined in the service sector, this reduction would not explain the problems in the manufacturing sector. Thus, we cannot blame the decline in manufacturing merely on surges in the number of workers — neither that created by the baby boom generation nor by women who have recently entered the workforce in large numbers.

4. More Industrialized Nations Grow More Slowly: Another factor that might explain the differences in economic performance among the nations we studied is their relative industrial maturity. It seems likely that countries with more developed economies would tend to have fewer opportunities for growth than less industrialized nations. For example, nations that can vastly improve their production technology by borrowing from more developed nations will grow faster. Also, nations that can shift a large number of people from the agricultural sector to the industrial sector will experience a boost in output. While the differences in economic maturity among the industrial nations we studied are narrow, the distinctions are still important.

To determine whether industrial maturity was a key factor in economic performance, we used two measures of industrialization to compare nations: average output per employed person (productivity) and the share of GDP accounted for by agricultural production. We would expect that nations with lower output per employee would grow more quickly by investing in production technology already employed elsewhere. We

also assumed that nations with a larger agricultural sector relative to GDP had a greater number of industrial opportunities to develop. By both of these measures, the United States ranks close to the top on the industrial maturity scale. America has had the highest level of output per employee over the last three decades (Table 4) and the second lowest share of GDP accounted for by agriculture (Chart 7).

While we found no evidence that the relative level of GDP per employee influenced growth and investment, nations with a larger agricultural component of GDP tended to perform better. Prior to the oil crisis, nations with larger agricultural sectors generally had higher investment plus faster economic and productivity growth. After 1973, the relationship between nations with a larger agricultural sector and faster economic and productivity growth disappears; however, the positive association between a large agricultural sector and a higher investment rate remains. We also found weak evidence that nations with lower output per employee had lower unemployment after the oil crisis.

One interesting finding was that the less industrialized nations in our study tended to experience higher inflation. This result was not unexpected because price increases are generally greater during periods of higher growth. However, it does help clarify why a higher inflation rate does not seem to indicate poorer economic performance cross-nationally.

In conclusion, our tests suggest that America's industrial maturity may be a major explanation for our relatively poorer economic performance, particularly prior to the energy crisis.

5. High Cost of the Military Burden: Our hypothesis is that a nation which spends a larger share of GDP on weapons and soldiers than other nations is likely

to experience less investment and poorer productivity growth. As a result, the competitiveness of a nation's manufactured goods may be eroded by a heavy military burden. Arms production diverts engineers and scientists from civilian projects. Some have suggested that building weapons attracts some of the brightest people within those fields because of the challenges and complexity of the work. [24] Even if it only attracts those of average ability, arms production probably reduces the number of highly skilled people working directly to increase the productivity and competitiveness of a nation's manufacturing sector.

A heavy military burden also tends to "crowd out" civilian investment, particularly when the economy is functioning close to peak capacity, as it was during the Vietnam War. When most of an economy's resources are fully employed, higher spending by the government reduces investment, no matter how the spending is paid for. If a government imposes higher taxes, individuals tend to reduce the amount they save and corporations have less revenue to invest. If the government borrows to cover military spending, increased competition for money may also reduce investment. Finally, if the government prints new money to pay for the armed forces, it creates the classic inflationary condition: too many dollars chasing too few goods. Inflation can reduce the incentive to invest.

Cross-national comparisons generally support our hypothesis. When we compared the share of output devoted to investment with the share spent on the military in 17 industrial nations, we found that those nations with a larger military burden tended to invest less (Chart 8). A negative correlation also exists between military expenditures and the growth in total manufacturing capital. Neither of these relationships deteriorated during the energy crisis.

Nations carrying heavier military burdens also tended to have lower productivity

growth. While we found strong evidence that military spending reduced productivity growth prior to 1973, our cross-national analysis did not yield similar evidence for the period after the oil crisis began. This finding may be explained by the fact that virtually every nation we studied had a lower military burden after 1973. It might also be the result of the increasingly complex nature of productivity growth after the oil crisis. We cannot be sure.

We also found weak evidence that higher military spending correlates with lower real economic growth. We suspect that the relationship between investment and real economic growth is at work here. For while it is weak, the negative relationship between the military burden and economic growth does not deteriorate during the 1970s.

Two indicators of economic performance, unemployment and inflation, were not associated with military spending. Given the significance of the negative association between military spending and investment, and the tendency of nations with lower investment to have higher unemployment, we expected to find that nations with higher military spending had higher unemployment. However, this relationship did not appear. Since it seems likely that, in the long run, high military spending leads to poorer performance, this link may be disguised by other factors. We also did not find a correlation between inflation and military spending. We were not surprised by this finding, however, given the lack of significant relationships between the inflation rate and other measures of economic performance.

Overall, our evidence suggests that military spending has hurt America's economic performance, particularly in the period prior to 1973.

C. Relationship Among Factors Affecting Performance. There were three findings in our cross-national analysis that we thought might be influenced by disguised relationships. First, we examined the possibility that the negative relationship between military spending and economic performance might be explained by the fact that more industrialized nations grow more slowly. Second, we analyzed factors that might explain why civilian government spending did not correlate with poorer economic performance, even though military government spending did. Finally, we looked for reasons why military spending did not seem to reduce personal consumption cross-nationally.

The strong correlation between countries with a heavier military burden and a smaller share of GDP accounted for by agriculture raises a critical question: What was the key factor in poorer economic performance, economic maturity or military spending? Some radical economists have suggested that maturity is the basic problem. In their view, military expenditures are greater in mature capitalist economies because arms production creates both investment opportunities and demand for goods and services at a time when the overall economy is stagnating. They argue that military expenditures are more politically acceptable than civilian programs because the Pentagon does not compete with private industries. Moreover, they believe that large military establishments help protect and expand the range of investment opportunities and markets for goods around the globe. [25] This line of reasoning would seem to suggest that military spending indeed bolsters economic performance during a period of stagnation.

While this is an intriguing suggestion, it is just as likely that the negative impacts of military spending and industrial maturity work in concert. Mature nations may find arms expenditures attractive for a variety of reasons; however, as a nation becomes more economically dependent on military spending, efficiency and

ingenuity seem to decline. Engineers working on military projects become accustomed to an environment where cost is not the central concern. [26] Moreover, defense dependency can discourage risk-taking by providing a stable source of revenues. [27] Combined with the diversion of resources entailed by arms spending, these factors probably contribute to economic decline. Our regression tests generally support this second approach: The military burden was negatively associated with economic performance after adjusting for the maturity level.

The second issue we explored could be seen as a major contradiction within our findings: Military expenditures correlate with poorer economic performance but civilian government expenditures do not. Two factors could explain this apparent contradiction.

First, civilian government spending may act as an important prerequisite for private investment. A large portion of civilian government funds are used to build and maintain the public infrastructure, including roads, schools and sewers. Far from being a hindrance, expenditures for transportation, education and sanitation lay the groundwork for a successful economy. It is fruitless to start a new business if there are not enough skilled workers; or if the transportation network is inadequate to bring materials and workers to and from the factory on time; or if there are no public utilities to provide electricity, water, and sewage treatment. While our cross-national data did not indicate that civilian government expenditures aid economic performance, this reasoning could explain why, on balance, civilian government expenditures do not hinder progress.

Another reason for the different impacts of civilian and military government spending may lie in the nature of civilian programs. Civilian spending is often a direct substitute for private consumption spending. For example, in countries that

decide that the government should pay for health care, personal medical expenditures will probably be lower. The same is true in the case of government-subsidized education, transportation, day care, libraries, and recreation. Moreover, tax systems tend to enforce this "tradeoff." Indeed, among the nations we studied, those that had higher levels of civilian government consumption usually had lower levels of personal consumption. This link was strong, particularly in the post-oil crisis data.

One additional finding that required review was the lack of correlation we found between the share of GDP spent on the military and the share spent on personal consumption. We might expect a negative relationship between these factors for two reasons. First, nations that devote a larger share of GDP to the military by definition spend less on some combination of the other three components of GDP: consumption, investment and civil government. Second, prior research on this subject indicates that both investment and consumption would be reduced by military spending. [28] The American experience since 1947 supports this view as well. During times of higher military spending, consumption and investment seem to have suffered proportionately during the Cold War. [29] Thus, we were somewhat confused by our finding.

Given the apparent tradeoff between personal consumption and civil government consumption, we tested the possibility that countries carrying heavier military burdens sacrificed some combination of these two forms of consumption. However, we found no evidence for a negative relationship between military spending and "civil consumption." We were left to surmise that, cross-nationally, consumption is not necessarily reduced as much by higher military spending as is investment.

IV. DOES THE MILITARY ENHANCE TECHNOLOGY?

Government officials, economists and scientists have also claimed that military spending encourages technological progress and results in civilian "spinoffs." If the benefits of military research offset the diversion of engineers and scientists from civilian efforts, then there would be reason to doubt our central hypothesis.

Two broad arguments have been advanced to explain how military efforts enhance technology. In one, military demands are seen as a prod that continually encourages scientists and engineers to expand the frontiers of knowledge. By setting higher performance standards than are typically encountered, military projects are said to increase the "state of the art." [30]

A second argument, viewing military spending as a source of demand for new products, typically runs this way: "By providing an initial market and premium prices for major advances, defense purchasers speeded their introduction into use." [31] Transistors and integrated circuits are good examples of innovations that benefited from defense purchases when the price was significantly higher than civilian firms were willing to pay. Purchases of these goods for defense and space applications allowed manufacturers to improve their products and reduce costs by gaining production experience, a phenomenon known in the field as "coming down the learning curve."

The military's substantial funding for advanced weapons systems and research and development has certainly yielded some benefits. To be seen in perspective, however, positive effects must be weighed against any negative influences arms programs may have on technological advancement. At least three broad areas should be considered. First, military-oriented research and production diverts scientists

and engineers from civilian pursuits. As a result, we are left with fewer people to develop civilian technologies such as consumer electronics, fuel-efficient cars, alternative energy systems and mass transit. This drawback is particularly worrisome when high technology resources are limited, as they are today. Competition between the Pentagon and private industry for highly skilled labor, key subcomponents and raw materials can drive up the price of American high technology products, making them less competitive in the world market.

Second, military-oriented programs can distort a new technology by encouraging applications that are too sophisticated to be marketed commercially. British and French experience with the Super-Sonic Transport (SST) program is one example of this problem. While the United States wisely chose not to develop a civilian SST, our European allies proved that the military's pioneering research on flying at supersonic speeds did not have widespread commercial application. Nuclear power, with its unsolved safety problems and excessive cost, is another example.

Finally, at the political level, we must assess the implications of according the military significant control over science and technology policy. While many of our politicians, including President Reagan, extoll the virtues of the free market, they still allow the Pentagon to control about a third of all public and private research and development funds and to purchase over 10 percent of the durable manufactured goods produced in our economy. These expenditures influence our technological and economic direction just as Japanese government policies controlling trade, encouraging investment and subsidizing research influence that nation's direction. Japan's goal is economic growth, whereas our government largely aims for technological superiority in armaments.

A. Measuring the Military's Impact on Technology. Between 1960 and 1973, Defense

Department contracts for hardware averaged 16.9 percent of the durable manufactured goods sold in the United States (Chart 9). Since then, hardware contracts have averaged 10.9 percent of durable manufactured goods production. Of the major hard goods purchased by the Pentagon over the past three decades, at least 70 percent have been components of high technology systems such as aircraft, missiles and space systems, and electronics and communications equipment. [32] As a result, the military's share of industry output in sectors such as aerospace, electronics and communications is considerably higher than for durable manufactured goods as a whole. Although the military's share of industry output was declining during the 1970s, the Defense Department's purchases have significantly influenced the direction of the high technology industries. Moreover, since these statistics exclude production of nuclear weapons and that portion of the space program with direct military applications, these figures could understate the military's claim on total technological resources by as much as a quarter.

The Pentagon further influenced technological development by funding 38.1 percent of all public and private research and development (R&D) between 1960 and 1973 (Chart 10). In the post-Vietnam period, this figure fell to 25.6 percent. Space-related R&D, at least 20 percent of which had direct military applications, [33] averaged another 11.8 percent of all R&D between 1960 and 1973. Since then, the space program has accounted for 7.2 percent of all public and private R&D.

Military R&D has been the federal government's largest mechanism for influencing technological growth. Defense Department R&D averaged 61.4 percent of all federal R&D between 1960 and 1973. Since then it has accounted for 52.7 percent. Space research accounted for another 16.7 percent before 1973 and 14.3 percent since then.

Between weapons procurement and R&D, the Pentagon employs a substantial share of our nation's technical personnel. Estimates of the percentage of scientists and engineers engaged in Defense Department-sponsored projects range from 15 to 50 percent. [34] While the higher estimates might have applied to the research and development during the 1950s and 1960s, they could not have covered all production personnel as well. [35]

The most accurate data come from a National Science Foundation (NSF) survey conducted in 1978. [36] NSF's data show that in 1978, 16.2 percent of the nation's engineers and scientists (excluding psychologists and social scientists) worked on national defense as their most important task (Chart 11). Another 3.8 percent primarily worked on space research. The percentages are significantly higher for fields directly related to aerospace and electronics. For example, 60.2 percent of the aeronautical engineers and over 35 percent of electronics engineers worked primarily on national defense. Since NSF's data were gathered for 1978, a year in which the share of GNP devoted to the military was at its lowest point since 1950, there is good reason to believe that the average percentage of all scientists and engineers involved in Defense Department programs over the past two decades is significantly higher.

The available data and estimates by other experts lead us to conclude that 25 to 35 percent of America's scientists and engineers worked primarily on Pentagon projects during the 1960s. During the 1970s, this figure probably dropped to between 15 and 25 percent. As a result of the current military buildup, this percentage is likely to rise significantly during the 1980s.

B. Costs and Benefits. If the economic benefits of devoting these technological resources to the military outweighed the costs, we would expect to find that the

technological superiority enjoyed by American industry during the 1960s would have been maintained or expanded. Since the Pentagon has "seeded" our research laboratories and purchased new products when they were too costly for civilian applications, American industry should have been in an excellent position to commercialize high technology goods. We would also expect that technological advancements resulting from our military effort would have enhanced the efficiency of our factories, leading to increases in manufacturing productivity. Indeed, since America's support for military technology was only part of the largest R&D effort undertaken by a major industrial nation (except the Soviet Union) over the past two decades, there is every reason to expect these results. Unfortunately, neither spinoff has occurred. Since 1960, American high technology industries have lost ground to the Japanese and the Western Europeans in the competition for shares of both the U.S. domestic and world-wide markets. Growth in the productivity of American manufacturers has also fallen substantially.

American firms have experienced some of their largest market-share reductions in industries that are heavily engaged in military contracting, including aircraft, electronics and machine tools. Although these American high technology industries are growing, they are not keeping pace with competition from abroad in civilian markets. For example, Japanese firms have virtually taken over the commercial electronics market, including televisions, stereos, portable radios and cassette players, and newly-introduced video cassette recorders. In 1964, the Japanese did not export color television sets. By 1977, the Japanese captured 42 percent of the world market and 37 percent of the American market for this product. [37] Japanese control over the video cassette recorder (VCR) market is even more one-sided. While the first video tape machines were produced in the United States for the television industry, the Japanese were the first to develop marketable consumer version. They currently control virtually all sales of VCRs. [38]

More importantly, the Japanese are making a concerted effort to challenge American preeminence in semiconductors. Development and production of these small silicon chips, which represent the "state of the art" in electronics technology, was dominated by American manufacturers as recently as 1974. Yet since that time, Japanese firms have entered the competition to mass-produce an important segment of this market, memory chips. In this quickly-changing field, the Japanese captured 40 percent of the market for the last generation of memory chips — 16K RAMs, random access memories that can store over 16,000 bits of information. In 1978, the Japanese introduced the first reliable 64K RAM, repesenting a four-fold increase in the storage capacity over the 16K RAM. The Japanese currently control about 70 percent of the world and 50 percent of the U.S. market in 64K RAMs and show every sign of becoming the industry leaders in this technology by being the first to introduce the next generation of memory chips: the 256K RAM. [39]

Similar deterioration of America's technological lead has occurred in machine tools and the emerging field of robotics. As recently as 1967, the United States accounted for 34 percent of the world production of machine tools. However, over the past decade, American firms have not kept pace with the growth of machine tool production in Western Europe. By 1981, U.S. manufacturers were responsible for only 19.5 percent of world output. Western European firms, led by the West Germans, now account for 34 percent of the total. [40]

American manufacturers are also failing to keep pace in the development of new machine tool technologies. While computer controlled machine tools and robotics were American innovations, helped along by Pentagon-sponsored programs, the Japanese now threaten to dominate the commercial application of these technologies during the next decade. Last year, Japanese machine tool builders accounted for over 50 percent of the sales of numerically-controlled machining centers in the

United States. [41] This is a staggering invasion, considering the fact that they accounted for only four percent of the U.S. market in 1974. The situation in robotics is hardly more encouraging. Today, there are 4,500 computer-programmable robots working in the United States, up from 200 in 1970. In Japanese factories, meanwhile, 14,000 robots have already been installed, accounting for 70 percent of the world total. [42]

In the commercial airframe market the European consortium, Airbus Industrie, is challenging Boeing for control of the world market for the new generation fuel-efficient jumbo-jets. Lockheed has already dropped out of that commercial market and McDonnell Douglas' DC-10 program continues to suffer substantial losses. Potentially more damaging to America's aircraft industry is its failure to develop an entry to compete in the booming commuter airline market. The Congressional Office of Technology Assessment estimates that by the year 2000, commuter airlines will order 6,000 new aircraft. Yet, in a pattern reminiscent of the U.S. auto industry in the 1960s, American manufacturers including Beech, Cessna and Piper have failed to invest in the technology neccessary to develop an aircraft that can compete effectively in that market. Consequently, America's commuter airlines are turning to Canadian, French and Brazilian firms to fill their needs. [43]

America's declining productivity growth also suggests that our technological progress has slowed. As discussed earlier, many factors influence productivity growth. Two of the more important paths to greater manufacturing efficiency are improving production technology and creating more attractive products. Funding for research and development should thus have a positive impact on productivity growth because new tools and new products are nurtured in our research labs. While traditionally the relationship between R&D and productivity growth has been found by economists to be quite significant, recent evidence suggests that the relationship

has changed. [44]

Cross-national data comparing R&D expenditures are indicative of this change. While American investment in R&D has been substantial, productivity growth has been weak. The United States has maintained the greatest number of R&D scientists and engineers and the highest proportion of these researchers in the total labor force of any country except the Soviet Union. We spend more on R&D than France, West Germany, and Japan combined. [45] In addition, U.S. expenditures on R&D as a proportion of GNP were higher then four of the five other industrial countries for which data can be obtained -- the United Kingdom, France, West Germany and Japan (Chart 12). The Soviet Union was again the exception. Yet in spite of this enormous R&D effort, U.S. productivity growth during the 1970s ranked second to last among those six nations.

If we chart the share of national resources that the six nations devoted to military and space R&D, we find that as that factor increases productivity growth tends to decline (Chart 12). The Soviet Union, the United States and the United Kingdom are at the top of the list in military-related R&D expenditures and at the bottom in productivity growth. It seems that while those nations have been locked in a technological arms race, Japan, West Germany and France have been concentrating on developing civilian technology that increases manufacturing efficiency.

One possible reason that military R&D does not seem to stimulate productivity growth is that only a small fraction of America's military R&D is spent on basic research. Technological exploration undertaken to expand the frontiers of science is an important source of innovation. The Defense Department, however, has spent only about three percent of its R&D funds for such purposes during the past two decades. [46] While the Pentagon spent almost half of all federal R&D dollars in

in 1980, three other federal agencies spent more funds on basic research -- the Department of Health and Human Services, the National Science Foundation, and the National Aeronautics and Space Administration. [47]

Although data on the loss of market shares and productivity growth are only suggestive, they cast doubt on the proposition that military spending helps technology more than it hinders it. We recognize that numerous factors influence international competitiveness and production efficiency. Yet the trends of those data support the thesis that the negative effects of military spending on technology outweigh the positive spinoffs. "The decline in productivity and industrial standards in the U.S.," commented one Japanese observer, "is the best argument against the idea that more defence contracts are vital to maintaining 'state of the art' efficiency." [48]

The reason that military spending has probably slowed our technological progress seems clear: Using scientific and engineering talent to solve military problems is an inefficient means of stimulating scientific or commercial advancement. Growth in scientific knowledge comes most readily from basic research without the constraint of specific applications. The development of new products, like fuel-efficient automobiles, alternative energy systems and computer-controlled machine tools, is most quickly accomplished by applying R&D talent directly. While military programs sometimes provide a market for new products and occasionally result in a civilian spinoff, much of the effort expended to develop weapons systems, like laser-guided missiles and electronic jamming devices, does not help the civilian economy. As one of the founders of TRW Corporation, Simon Ramo, puts it:

> [T]he fallout [from military spending] has not been so great as to suggest that for every dollar of military technology expenditure we realize almost as much advance of the non-military fields as if we had spent it directly on civilian technology. Probably our relative

> productivity increases and our net rating in technology vis-a-vis other nations have on the whole been hurt rather than helped by our heavier involvement in military technology as compared with other nations. [49]

The nature of military spending and the Pentagon's spending patterns heavily contribute to inefficiency. Since the military stresses high performance over cost, technologies developed for the military are often too expensive and complex for widespread civilian use. Evidence of this problem can be found in the difficulties that military contractors have experienced attempting to develop civilian products. For example, attempts to enter the mass transit market by Boeing Vertol (trolley cars), Rohr (subway cars) and Grumman (buses) all failed in part because their products were too complex and unreliable. Many of the technologies that do have civilian application, like radar and nuclear power, had to undergo significant redesign before they were commercially viable. [50] Military contracting also tends to favor larger firms that tend to be less innovative and create fewer new jobs than smaller enterprises. [51] Since the 1950s, about 80 percent of all military contracts (including R&D and procurement) have gone to large firms. [52]

V. CONCLUSION

While numerous factors influence economic performance, America's heavier military burden seems to have stifled investment, and reduced our economic and productivity growth over the last few decades. During the 1950s and 1960s, higher arms expenditures in the United States probably allowed other industrial nations to close the economic gap separating America from the rest of the world more quickly than if we had spent less on the military. While more industrialized nations tend to grow more slowly, our economy probably would have performed significantly better if the United States had reallocated a portion of the resources used by the military.

For example, if the government had more heavily subsidized the development and repair of mass-transit systems in major metropolitan areas throughout the United States, we could have sustained and expanded the now-failing American mass-transit vehicle industry, reducing the need to import subway cars from Europe, Canada and Japan to fill the needs of New York, Boston and Philadelphia. If the government had not spent so much on high technology military products, the engineers doing military work might have developed commercial electronics products to compete more effectively with the Japanese. Our highly skilled people might also have worked on developing renewable energy resources. Moreover, we also could have used part of the "peace dividend" to assist sound economic progress in some of the world's poorest nations, [53] thereby helping open up new markets for our goods and services. Surely, given the wide array of possible alternatives, we would have found productive jobs for the thousands of engineers, scientists and skilled workers who were building weapons for the "electronic battlefield."

Military spending also slowed economic performance during the 1970s. While the rising cost of energy clearly damaged performance across the board in the industrial world, military spending continued to draw away resources that could have been used to develop energy self-sufficiency. Moreover, if more engineers and greater investment had been available to the private sector after 1973, American business might have been able to offset part of the higher cost of energy by expanding exports of U.S. manufactured goods.

Increased arms expenditures during the Reagan administration could have the opposite effect on the economy that they had during the Second World War. As the "arsenal of democracy" during that war, America built its industrial base while other nations saw their industrial power consumed by the fires of war. Yet during the next decade, if we increase arms expenditures in the United States while most other advanced nations concentrate on expanding their industrial strength, we could be left watching our economic health continue to slip away.

FOOTNOTES

1. Thomas Etzold and John Lewis Gaddis, eds., Containment: Documents on American Policy and Strategy, 1945-1950 (New York: Columbia University Press, 1978), p. 426.

   John Lewis Gaddis, Strategies of Containment (New York: Oxford University Press, 1982), p. 94.

   Frank Pace, Jr., Address before the American Bankers' Association, September 1957, quoted in Report from Iron Mountain (London: McDonald & Co., 1967), p. 69.

2. George Wilson, "Senators Urge Defense Spending Cut," The Washington Post, February 2, 1983, pp. A1, A10.

   Harold Brown, "Statement and Annex," before U.S. Congress, Senate Committee on the Budget, February 27, 1980, p. 5.

3. Adam Smith, The Wealth of Nations (New York: Modern Library, 1937), p. 315.

4. For a discussion of the Truman and Eisenhower administration's views of the economic impact of military spending see: John Lewis Gaddis, Strategies of Containment: A Critical Appraisal of Post War American National Security Policy (New York: Oxford University Press, 1982), pp. 92-95, 132-136.

5. U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, January 1976, Table 1.

6. Economic Report of the President, (Washington, D.C.: U.S. GPO, February 1982), Tables B-24 & 29.

7. U.S. Department of Labor, Bureau of Labor Statistics, "The Unemployment Situation: December 1982," News, January 7, 1983, Table C.?

8. U.S. Department of Labor, Bureau of Labor Statistics, "Statistical Supplement to International Comparisons of Unemployment, Bulletin 1979," unpublished, June 1982, Supplement to Table 3, p. 10.

9. Organisation for Economic Cooperation and Development, National Accounts of OECD Countries, 1950-1980, Volume I (Paris, OECD, 1982).

10. Ibid., p. 88.

11. The Business Week Team, The Reindustrialization of America, (New York: McGraw-Hill Book Co., 1982), p. 10.

12. Ibid.

13. Ira C. Magaziner and Robert Reich, Minding America's Business: The Decline and Rise of the American Economy (New York: Harcourt Brace Jovanovich, 1981), pp. 75-77.

14. N.Y. Stock Exchange, Office of Economic Research, "U.S Economic Performance in a Global Perspective," February 1981.

15. Peter Drucker, "The Danger of Excessive Labor Income," The Wall Street Journal, January 6, 1981.

16. Robert H. Hayes and William J. Abernathy, "Managing Our Way to Economic Decline," Harvard Business Review, July-August 1980.

Leslie Wayne, "Management Gospel Gone Wrong," The New York Times, May 30, 1982.

17. Nathaniel J. Mass and Peter M. Senge, "Reindustrialization: Aiming for the Right Targets," Technology Review, Volume 83, Number 8, August/September 1981.

18. Seymour Melman, The Permanent War Economy: American Capitalism in Decline (New York: Simon & Schuster, 1974), Chapters 4 and 5.

Lloyd J. Dumas, ed., The Political Economy of Arms Reduction (Boulder, Colo.: 1982), Chapter 1.

Mary Kaldor, The Baroque Arsenal (New York: Hill and Wang, 1981), Chapters 2 and 3.

Ronald P. Smith, "Military Expenditure and Investment in OECD Countries, 1954-1973," Journal of Comparative Economics, No. 4, 1980, pp. 19-32.

R.P. Smith, "Military Expenditure and Capitalism," Cambridge Journal of Economics, No. 1, 1977, p. 61-76.

19. U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Price Indexes, Fifteen Countries, 1950-1981," unpublished, June 1982.

20. Organisation for Economic Cooperation and Development, National Accounts of OECD Countries, 1961-1978, Volume II (Paris, OECD, 1980).

21. Alfred S. Eichner, "Consequences of the Budget: Reagan's Doubtful Game Plan," Challenge: The Magazine of Economic Affairs, May/June 1981, Volume 24, Number 2, p. 19-27.

Bryan Wilson, "The Effect of Compositional Changes in Government Expenditures on Economic Growth," unpublished paper, Rutgers the State University, December 17, 1980.

22. George Terborgh, "The Productivity Puzzle" (Washington, D.C.: Machinery and Allied Products Institute, December, 1981).

23. Lester Thurow, The Zero-Sum Society (New York: Penguin Books, 1981), p. 46-47.

24. Thurow, "How to Wreck the Economy," The New York Review of Books, May 14, 1981.

25. Paul Baran and Paul Sweezy, Monopoly Capital (New York: Modern Reader, 1968), Chapter 7.

Michael Reich, "Does the U.S. Economy Require Military Spending," The American Economic Review, May 1972, pp. 296-303.

26. Melman, op. cit., Chapters 2 and 4.

27. Kaldor, op. cit., Chapter 2.

28. Bruce Russett, What Price Vigilance? (New Haven, Conn.: Yale University Press, 1970), pp. 137-146.

Kenneth Boulding, "The Impact of the Defense Industry on the Structure of the Economy," in Bernard Udis, ed., The Economic Consequences of Reduced Military Spending (Lexington, Mass.: Lexington Books, 1973), pp. 225-252.

29. Robert W. DeGrasse Jr., Military Expansion, Economic Decline (New York: Council on Economic Priorities, 1983), pp. 91-92.

30. Simon Ramo, America's Technology Slip (New York: John Wiley & Sons Inc., 1980), pp. 79-80.

G.P. Dineen and F.C. Frick, "Electronics & National Defense: A Case Study," in Electronics: The Continuing Revolution, P. Abelson and A. Hammond, eds., (Washington, D.C.: American Association for the Advancement of Science, 1977), pp. 82-83.

David Blond, "On the Adequacy and Inherent Strengths of the United States Industrial and Technological Base: Guns versus Butter in Today's Economy," Mimeograph, Office of the U.S. Secretary of Defense, Program Analysis and Evaluation, 1981.

31. James M. Utterback and Albert E. Murray, "The Influence of Defense Procurement and Sponsorship of Research and Development on the Development of the Civilian Electronics Industry," (Boston, Mass.: Center for Policy Alternatives, Massachusetts Institute of Technology, June 30, 1977), p. 3.

32. U.S. Department of Defense, Washington Headquarters Service, Prime Contract Awards, FY 1981, February 1982, Table 6.

33. DeGrasse, op. cit., p. 215.

34. Jacques S. Gansler, The Defense Industry (Cambridge, Mass.: MIT Press, 1980), p. 54, (estimates that 20 to 30 percent of all scientists and engineers work on military projects).

Richard Dempsey and Douglas Schmude, "Occupational Impact of Defense Expenditures," Monthly Labor Review, December 1971, p. 12, (estimates 20 percent).

Murray L. Weidenbaum, Economics of Peacetime Defense (New York: Praeger, 1974), p. 27, (estimates 50 percent).

Ramo, op. cit., p. 80, (estimates 50 percent).

35. "52 per cent of the engineers and scientists engaged in research and development work in American industry in 1963 were working on projects financed by defense or space programs," from William L. Baldwin, The Structure of the Defense Market (Durham, N.C.: Duke University Press, 1967), p. 146.

36. National Science Foundation, Characteristices of Experienced Scientists and Engineers 1978 (Washington, D.C.: N.S.F., 1979).

37. Ira C. Magaziner and Robert Reich, Minding America's Business: The Decline and Rise of the American Economy (New York: Harcourt Brace Jovanovich, 1981), p. 169.

38. Electronic Industries Association, phone conversation with a public affairs officer, October 1982.

39. Andrew Pollack, "Japan's Big Lead in Memory Chips," The New York Times, February 28, 1982, p. F1.

40. The American Machinist, February 1982, p. 107.

41. National Broadcasting Corp., Inc., Transcript, NBC Reports: Japan vs. USA, The High Tech Shootout, (New York: NBC, August 14, 1982), p. 34.

42. Robert Ayres and Steve Miller, "Industrial Robots on the Line," Technology Review, May/June 1982, p. 38.

43. "Study Is Critical of U.S. Aircraft Makers," The New York Times, February 22, 1982.

44. Eleanor Thomas, "Recent Research on R&D and Productivity Growth: A Changing Relationship Between Input & Impact Indicators?," (Washington, D.C.: NSF, September 1980).

45. National Science Board, Science Indicators 1980, (Washington, D.C.: NSF, 1981), p. 2.

46. Ibid., p. 270.

47. Ibid., p. 269.

48. Tracy Dahlby, "Can the U.S. Really Guarantee Our Security in Wartime?," Far Eastern Economic Review, December 5, 1980, pp. 55-56.

49. Ramo, op. cit., p. 251.

50. Utterback and Murray, op. cit., p. 25.

Wall Street Journal, May 6, 1963, cited in Baldwin, op. cit., p. 145.

51. U.S. DoD, Prime Contract Awards, op. cit., Chart II.

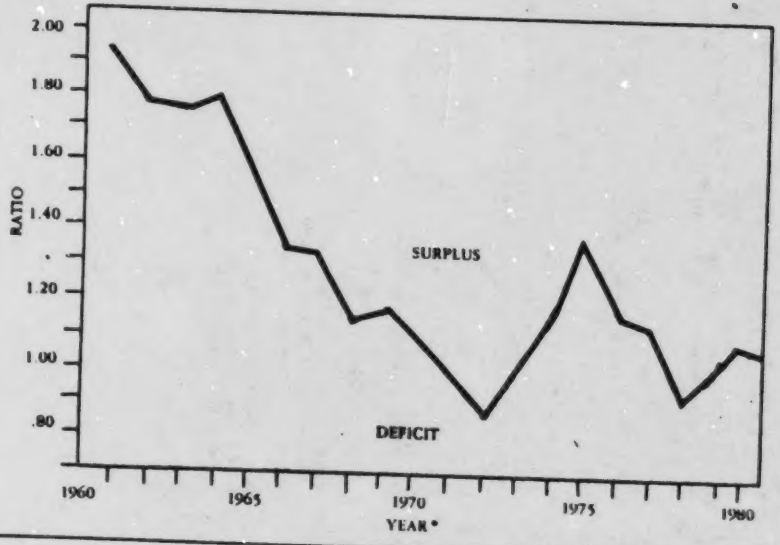
52. Richard S. Morse, "The Role of New Technological Enterprises in the U.S. Economy: A Report of the Commerce Technical Advisory Board to the Secretary of Commerce," (Washington, D.C.: Commerce Department, January 1976).

53. Wassily Leontieff and Faye Duchin, Military Spending: Facts and Figures, Worldwide Implications, and Future Outlook (New York: Oxford University Press, 1983), Chapters 6 and 7.

29-794 O—84——4

Chart 1

Ratio Of U.S. Manufactured Exports
To Manufactured Imports
1960 – 1981



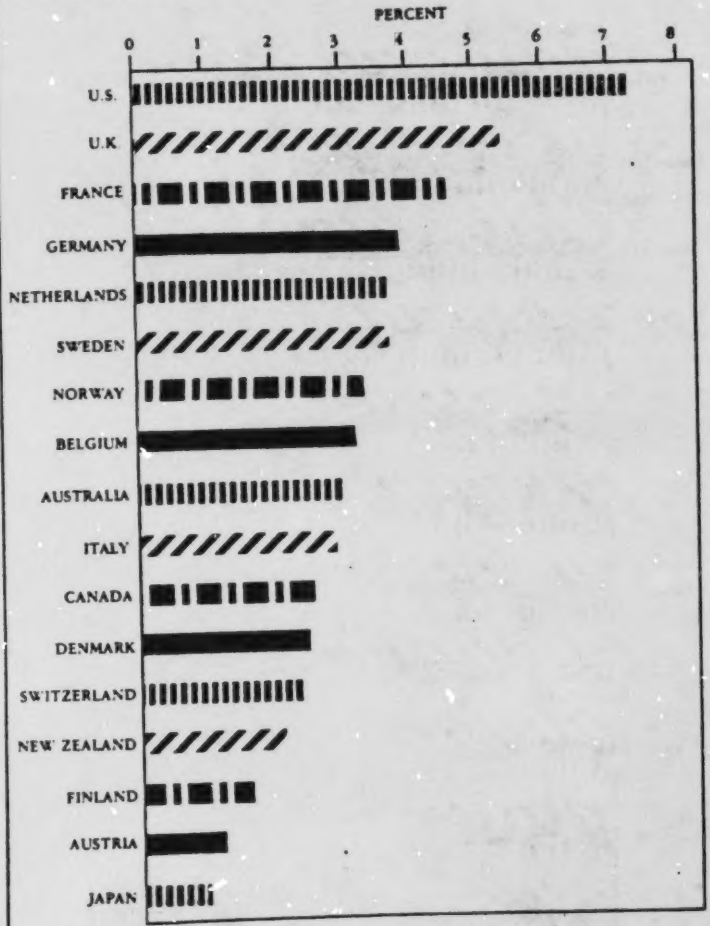
*For the 1960 to 1974 period, the ratio was computed by dividing exports on an f.a.s. (fee alongside ship) basis by the customs value of imports. For 1974 to 1981, it was computed by dividing exports (f.a.s.) by imports (f.a.s.).

Source: *Economic Report of the President* (Washington, D.C.: U.S. GPO, February 1982), p. 350.

Chart 2

Military Spending As A Share Of GDP

Selected Nations
1960 – 1980

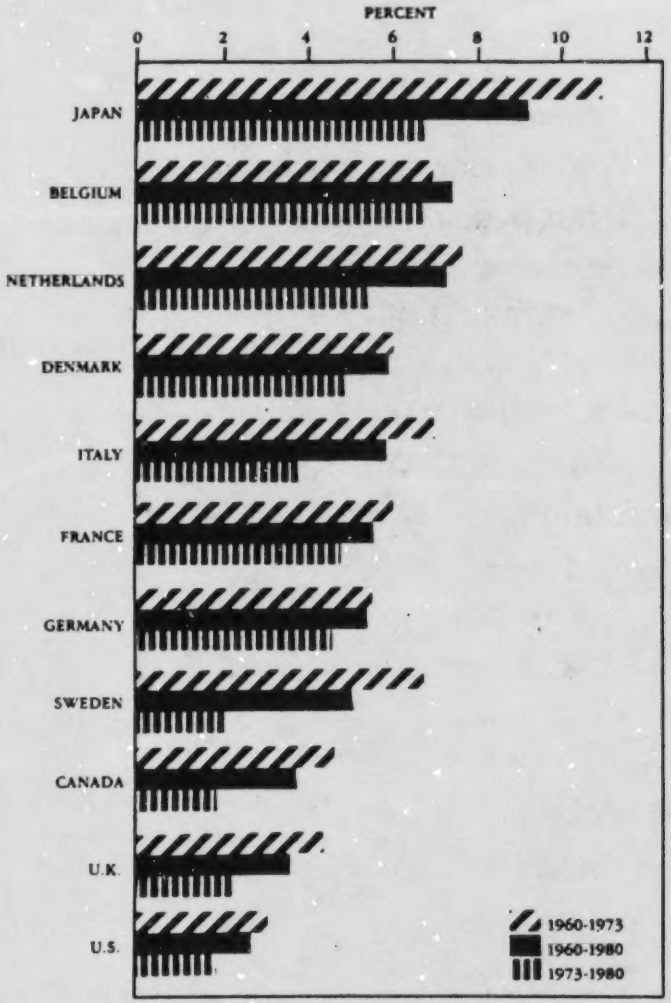


Sources: Stockholm International Peace Research Institute, *World Armaments and Disarmament, SIPRI Yearbook 1982* (London: Taylor & Francis Ltd., 1982), pp. 150-151. SIPRI, *Yearbook 1975* (Cambridge, Mass.: MIT Press, 1975), pp. 122-123, 126-127, 132-133.

Chart 3

Productivity Growth In Manufacturing Industries

Selected Nations 1960 – 1973, 1960 – 1981, 1973 – 1981



Source: U.S. Department of Labor, Bureau of Labor Statistics, "International Comparisons of Manufacturing Productivity and Labor Cost Trends, Preliminary Measures for 1981," June 2, 1982, Table 1.

Chart 4

Fixed Investment As A Share Of GDP

Selected Nations
1960 – 1980

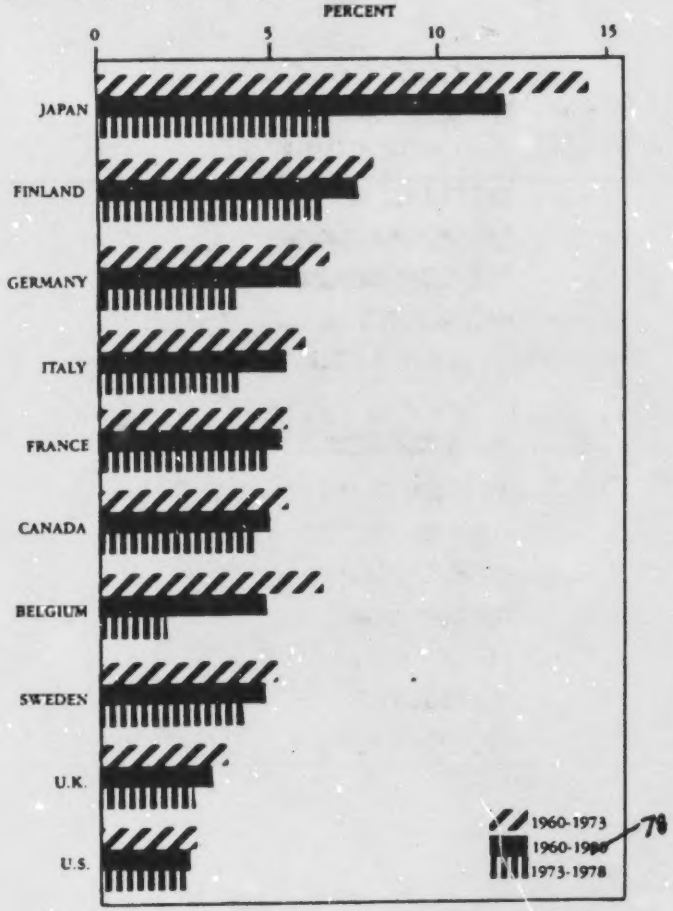
Sources: United Nations, *Yearbook of National Accounts Statistics, 1979* (New York: U.N., 1980). Organisation for Economic Cooperation and Development, *National Accounts of OECD Countries, 1950-1980, Volume I* (Paris: OECD, 1982).

Chart 5

Manufacturing Capital Growth

Selected Nations

1960 – 1973, 1960 – 1978, 1973 – 1978

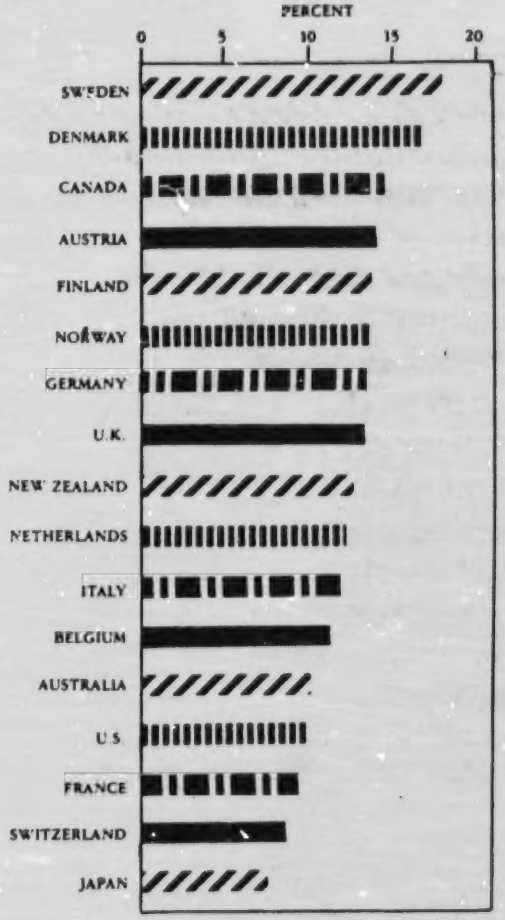


Source: Organisation for Economic Cooperation and Development, unpublished data.

Chart 6

Civilian Government Consumption As A Share Of GDP

Selected Nations
1960 – 1980



Sources: Organisation for Economic Cooperation and Development, *National Accounts of OECD Countries, 1950-1980, Volume I* (Paris: OECD, 1982). Stockholm International Peace Research Institute, *World Armaments and Disarmament, SIPRI Yearbook 1982* (London: Taylor & Francis Ltd., 1982), pp. 150-151. SIPRI, *Yearbook 1975* (Cambridge, Mass.: MIT Press, 1975), pp. 122-123, 126-127, 132-133.

Chart 7

Agriculture As A Share Of GDP

Selected Nations
1960 - 1979

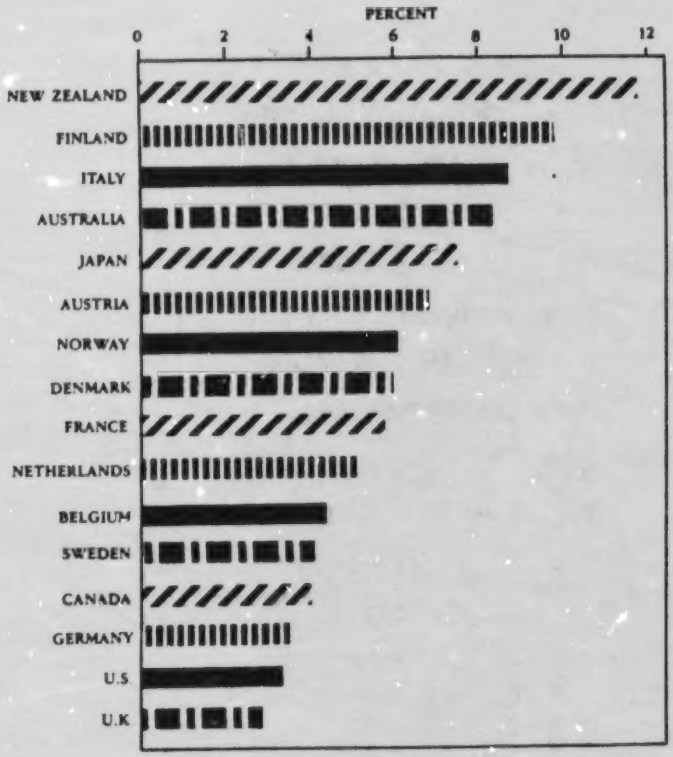
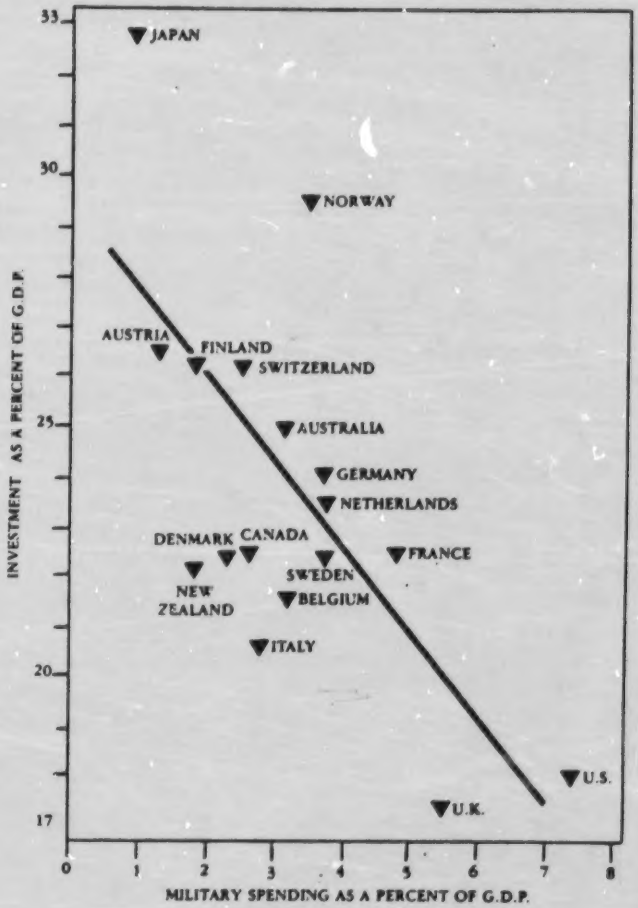


Chart 8

Investment Vs. Military Spending

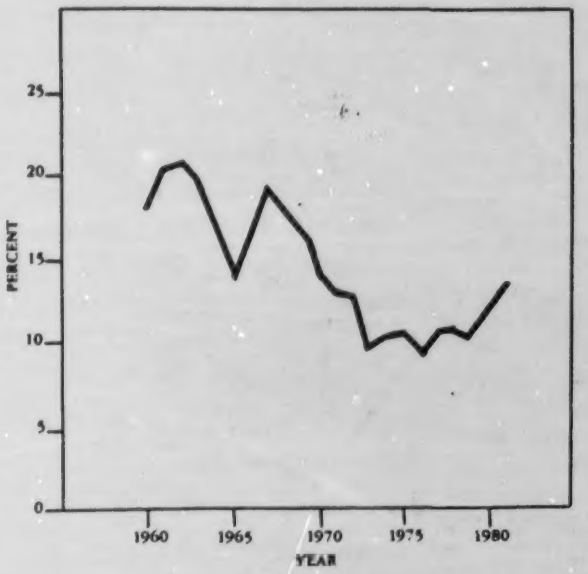
Selected Nations
1960 – 1980



Source: Appendix B.

Chart 9

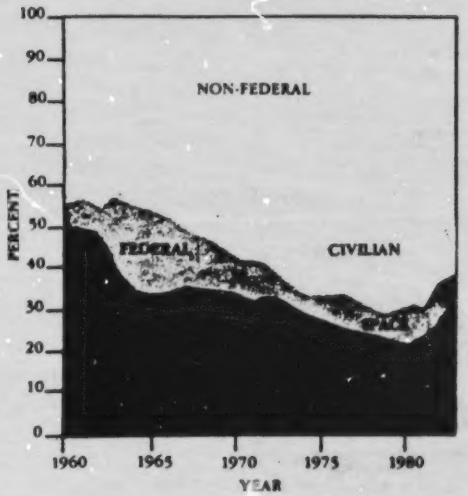
Major Hard Goods Purchased By The DoD
As A Share Of Durable Manufactured Goods
1960 - 1981



Sources: U.S. Department of Defense, Washington Headquarters Service, "Prime Contract Awards, FY 1981," Table 6. *Economic Report of the President* (Washington, D.C.: U.S. GPO, February 1982), p. 244.

Chart 10

National R & D Spending By Objective

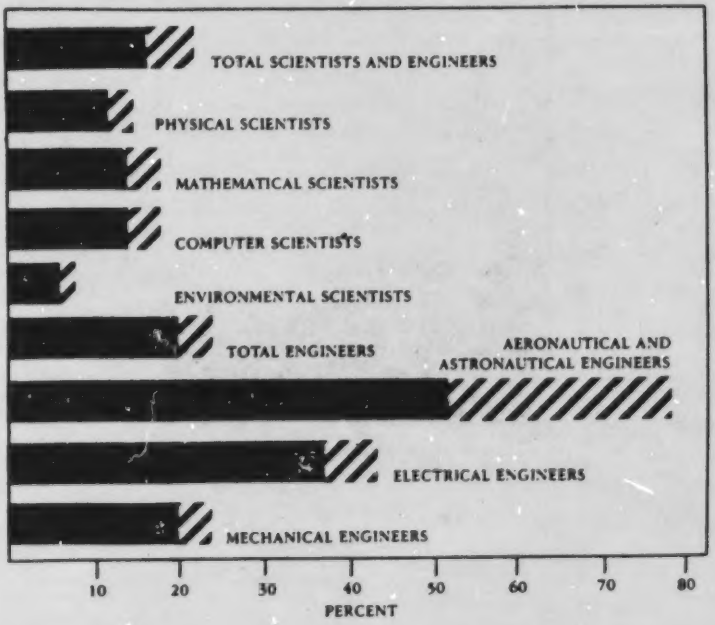


Sources: U.S. National Science Foundation, "National Patterns of Science and Technology Resources, 1981" (Washington, D.C.: U.S. GPO, April 1981). U.S. National Science Foundation, *Science Resources Series Highlights*, August 1982, Table 1, p. 3. Figures for 1982 and 1983 obtained from John Chirichiello of NSF, February 17, 1983.

Chart 11

Scientists And Engineers Working Primarily On National Defense and Space Projects

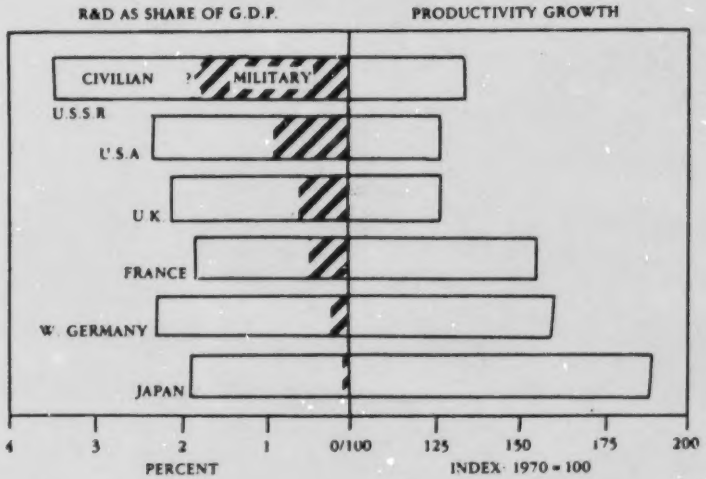
1978



Source: U.S. National Science Foundation, "Characteristics of Experienced Scientists and Engineers, 1978, Detailed Statistical Tables," (Washington, D.C.: U.S. GPO, 1978), Table B-13.

Chart 12

Average Military And Civilian R & D Expenditure
As A Share Of GDP
Vs.
Productivity Growth In Manufacturing Industries
Selected Nations
1970 - 1979



Source: U.S. National Science Board, *Science Indicators, 1980* (Washington, D.C.: NSF, March 1981), pp. 210, 212, 220.

Table 1

U.S. Merchandise Trade Balance By Commodity Group
1960 – 1981
(Millions of Dollars)

	FOOD, BEVERAGES, AND TOBACCO	CRUDE MATERIALS AND FUEL	MANUFACTURED GOODS
1960+	$ -862	$ -476	$ 6,236
1965+	506	-1,167	6,189
1970+	-1,172	150	3,437
1971+	-1,328	827	29
1972+	-810	-1,747	-4,027
1973+	3,703	-2,711	-270
1974+	4,532	-16,040	7,321
1974*	4,524	-16,262	8,300
1975*	6,870	-17,399	19,871
1976*	5,343	-25,379	12,466
1977*	1,736	-34,975	3,597
1978*	4,861	-30,944	-5,844
1979*	6,852	-43,168	4,361
1980*	11,856	-60,254	18,769
1981*	14,830	-60,068	11,739

+ F.a.s. (free alongside ship) value of exports minus customs value of imports.

*F.a.s. value of exports minus f.a.s. value of imports.

Source: *Economic Report of the President* (Washington, D.C.: U.S. GPO, February, 1982), p. 350.

Table 2

Hourly Compensation Costs of Production Workers in Manufacturing

Selected Industrial Nations
(U.S. Dollars)

COUNTRY	1960	1965	1970	1975	1980
Belgium	$ .82	$ 1.29	$ 2.06	$ 6.54	$ 13.18
Sweden	1.20	1.87	2.93	7.18	12.51
West Germany	.85	1.40	2.33	6.19	12.26
Netherlands	.67	1.23	2.12	6.53	12.17
United States	2.66	3.14	4.18	6.35	10.00
France	.82	1.23	1.72	4.58	9.23
Canada	2.13	2.28	3.46	6.11	9.04
Italy	.62	1.11	1.74	4.60	8.26
United Kingdom	.84	1.15	1.49	3.27	7.37
Japan	.26	.48	.99	3.05	5.64

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Hourly Compensation Costs and Direct Pay for Production Workers in Manufacturing, Ten Countries, 1960-1981," unpublished data, April 1982.

Table 3

Real Gross Domestic Product Per Employed Person

Selected Nations
Based on International Price Weights
(Index: United States = 100)

COUNTRY	1950	1960	1970	1980
Netherlands+	58.3	66.3	79.3	96.5
Canada	84.4	89.7	91.1	93.3
Belgium	55.7	60.0	73.1	91.9
France	42.2	53.5	70.7	91.6
West Germany*	37.2	56.1	70.7	89.4
Italy	27.7	38.0	57.6	68.1
Japan	16.8	25.8	50.0	68.0
United Kingdom	53.5	53.9	56.8	61.3

+ Employment figures for the Netherlands are Dutch estimates of work-years of employed persons.

*Excluding the Saar and West Berlin in 1950.

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Comparative Real Gross Domestic Product, Real GDP Per Capita, and Real GDP Per Employed Person, 1950-1981," unpublished data, April 1982, p. 7.

Table 4

Growth in the Capital to Labor Ratio in the U.S. Manufacturing Sector
Selected Periods
(Annual Rate of Change)

	1960-1973	1973-1981	1960-1981
Total Manufacturing Capital	2.7 %	2.5*	2.6*
Manufacturing Labor	1.6 %	.6	.9
Capital to Labor Ratio	1.1 %	1.9	1.7

*Manufacturing capital data ends in 1978.

Sources: Organisation for Economic Cooperation and Development, unpublished data. U.S. Department of Labor, Bureau of Labor Statistics, "International Comparisons of Manufacturing Productivity and Labor Cost Trends, Preliminary Measures for 1981," June 2, 1982, Table 1.

29-794 O—84——5

Mr. ASPIN. Thank you very much. It is a very interesting paper.

Let me start with a question on inflation. Basically, what you are saying is that the only real impact of defense in creating inflation that you see might be a bottleneck effect of some kind. Is that the real possibility?

Mr. DEGRASSE. What I was trying to do is address the issue that there seems to be an inherent relationship between defense spending and inflation. There are a number of different ways you can argue that defense spending creates inflation, and I will give you three of them.

The first one is that defense spending creates inflation through quick shifts in the type of demand that is required from the economy. We are making a dramatic shift. We are saying we want the economy to produce this much more than before. As a result, you put stringent requirements on the economy, and people in the economy say, "If you want me to do that, you will have to pay me more to shift jobs to work on military work." As a result, if you significantly shift demand or expand the demand in the economy, there is a possibility that there would be some sort of bottlenecks that will occur; and, as a result, you will get inflationary conditions.

What I would like to say, as well, is that that is controllable. As we saw during the Korean war, they did have a blip in inflation in the first year. But it was controllable through wage and price controls put on the economy, and there were allocation controls attempted to be placed on the economy. So that is a controllable type inflation.

The second inflationary effect one might see results from the way, in the macro sense, that you pay for the buildup. There are three different paths. You can take it from taxes directly. That is not necessarily going to create inflation at all. You are taxing it directly. You are not creating the classic inflationary conditions of too many dollars chasing too few goods, so there is no reason you get inflation there.

On the other hand, you can print money, by allowing the money supply to grow. Here you have the Vietnam case, and there you have the traditional problem of too many dollars chasing too few goods.

The final way to pay for it, the one we have chosen by default in this particular circumstance, is to expand borrowing by the Federal Government. Now, expanding borrowing by the Federal Government means that there is going to be some adjustment that will be required of the credit markets.

The usual adjustment is to raise interest rates. So in that case, raising interest rates could have an inflationary effect through another couple of steps in the process—because it raises the price of money, raises the costs of holding inventory and those costs will be passed along, but that is a further chain of events.

The final sort of chain where you have, first of all, backlogs, second of all, how you pay the buildup at a macro level, and the third chain of logic, you might say, that military spending has an inflationary effect is to look at the issue of what does it do to long-term productivity capabilities in this Nation.

This is an argument you will hear more about when Prof. Seymour Melman testifies. If military spending does reduce our ability to offset price increases in the economy by reducing our ability to increase productivity growth, then as a result you could create inflation because you will not be able to offset price increases.

That is a third logic chain that might make you suspect that military spending has inflationary effects. But the thing that I wanted to say overall here was that there is no sort of preordained relationship between military spending and inflation, that there are three logic chains you might want to go through to believe that there is an effect on inflation or that there are three areas you might want to look at carefully to assess whether or not military spending was going to create inflation or not in a particular build-up.

Mr. ASPIN. Let me ask about the jobs side. You get direct and indirect jobs from the first level of spending; right?

Mr. DEGRASSE. Yes.

Mr. ASPIN. The multiplier makes the induced jobs. What assumptions do you make about investment? Do you assume idle capacity or is part of indirect jobs creating plant and equipment?

Mr. DEGRASSE. I am using the BLS, Bureau of Labor Statistics, models. The model of the economy that the BLS uses to determine employment requirements does not include investment that is required to produce the output—it does not include capital expenditures as one of the supplier industries per se.

Mr. ASPIN. All right.

Mr. DEGRASSE. Certainly there is a need for investment, of course, often. In that sense, I am not sure that that is included in the equation. But the induced area that we talked about, that employment clearly follows on.

What we are talking about is a short-term model of the economy that you can try to look at the first order effects. The BLS created this employment requirements table to see what the first order effects are.

If Marion Anderson had been here this morning to talk to you about the effects on employment, she would have talked about the first order effects of military spending on employment. And, indeed, the first order effects are to create fewer jobs in a limited number of industries compared to other industries in the economy which tend to have a broader impact and create more jobs.

Mr. ASPIN. So you assume when you are making the calculations, that the plant and equipment are there?

Mr. DEGRASSE. Yes.

Mr. ASPIN. So indirect employment would be—if you make airplanes, for example—in the steel industry?

Mr. DEGRASSE. Not in the steel industry; titanium if you are making——

Mr. ASPIN. But it would be in products that go into the production of the plane.

Mr. DEGRASSE. Yes.

Mr. ASPIN. In these estimates, you assume that there is enough idle capacity in machinery and in plant and equipment?

Mr. DEGRASSE. That is the BLS assumption.

Mr. ASPIN. And when you look at direct and indirect effects, you assume that induced effects will probably be similar throughout. It doesn't matter after the first round, because the multiplier is probably going to work in roughly the same way no matter where you start.

Mr. DEGRASSE. Right. The fact is that because in the military's case, where you have lower first order employment but higher wages, the amount of money spent on those wages creates a little more induced employment as a result, so you get a balancing out.

We are talking in very, very general terms but as the CBO will undoubtedly testify, their assessment indicates that overall military spending versus civilian spending, if you look at all three orders of effects, it is really a washout. It is roughly the same. So in a general sense——

Mr. ASPIN. What they are talking about is $1 billion of defense across the board; right?

Mr. DEGRASSE. Any number of dollars.

Mr. ASPIN. I know, but *x* number of dollars across the board.

Mr. DEGRASSE. Right.

Mr. ASPIN. In other words, they are not taking it just from procurement or personnel; they are taking a set amount of money out of defense spending which would be roughly in proportion to what defense spends its money on.

Mr. DEGRASSE. Actually, to contradict myself and to use the Congressional Budget Office's assessment, they found that if you look at just procurement alone as opposed to defense spending as a whole—which is what they found seemed to balance out—if you look at procurement alone, you get a slightly smaller amount of jobs as a result of military spending.

But the difference is not particularly important. I think if we are talking about these first order effects, $1 billion there, or $1 billion there, it really is going to have at the broadest macroeconomic level not a lot of difference. The interesting issues are, what industries and what jobs are created.

Mr. ASPIN. Let me pursue that. What I am asking now assumes that you take $1 billion from defense across the board, that is, $1 billion roughly apportioned the way defense spends it; so much on personnel, so much on O&M, so much on procurement, whatever.

Mr. DEGRASSE. All right.

Mr. ASPIN. And you shift that to another part of the budget, say into the health field or into education or, in other words, if the Congress were to take that money and make that straight transfer, you are saying that in essence there would be no employment effect?

Mr. DEGRASSE. The employment effects would be, one, at the macro level, you would have virtually no difference; and, two, at the specific level of the direct and indirect employment, you would have a rather dramatic difference.

You would have employment—I am speaking in very general terms—but the employment would tend to be located in the Northeast and Midwest.

Mr. ASPIN. I know there is a geographic difference.

Mr. DEGRASSE. Yes.

Mr. ASPIN. But I am talking about macro. You say there is no difference?

Mr. DEGRASSE. Right.

Mr. ASPIN. Suppose we took it out of something very specific in defense. Suppose we took it out of shipbuilding and we canceled a new aircraft carrier, a couple of billion dollars, $2 or $3 billion, whatever it costs, and you take that out of a very specific part of the defense budget and you put it into a very specific program somewhere else. Suppose we took the money from the aircraft carrier, $2.3 billion or whatever they cost now, and put it into title I of the Education Act. What would be the employment effect of that?

Mr. DEGRASSE. Here I am not sure how you cut conservative, liberal, or whatever in this particular issue, but I would tend to think just from simply a logical viewpoint that there would be no overall macroeconomic impact of that particular shift.

Now, we could talk about what types of specific first order effects occur—as a result of shipbuilding—and if you want to create jobs, shipbuilding isn't a bad way to do it in comparison to missile production or aircraft production. They tend to be a little less effective. If you want to employ semiskilled workers—shipbuilding, being cynical for a moment—shipbuilding may not be a bad way to do that.

But taking dollars from the procurement budget and shifting them to another part of the budget, you are going to have different geographic effects, different first order effects—very dramatic differences in those areas which I testified to.

But the overall macroeconomic impact, and the CBO would say there would be slightly fewer jobs overall created by this shift from procurement to civilian employment, that there would be a little more employment created as a result of that. I think that it is basically an insignificant number.

At the macro level, there is really an insignificant change. We are talking only about first order effects. This is first order macroeconomic effects. If we are talking about that, then there are not any real effects. We are not talking about what effects that has on the growth in the economy through all the other issues we talked about.

Mr. ASPIN. I understand. Mr. Fazio.

Mr. FAZIO. I apologize for not being here for all of your testimony, but I will be reviewing it, particularly in relation to R&D expenditures. It appears that we are doing more R&D in the Department of Defense budget than in the Department of Energy and elsewhere. Perhaps this is having direct or indirect effects on private R&D. How do you evaluate the long-term economic benefits of R&D expenditures in the defense sector versus other sectors of the budget?

Mr. DEGRASSE. That is a very difficult question. Indeed, that was the issue I think we wrestled with most in the work we did on this study.

My view is equivocal. My view is that—while there are positive impacts that result from military spending—I think on the whole, the beneficial effects are less if you spend a dollar on military research and development than if you spend it directly on the specific task at hand.

As a result, there is an opportunity cost there. The gap between the effectiveness of spending it directly on the problems you are interested in solving and spending it on defense, there is an opportunity cost there.

In that sense, then, we have to say that there is probably a long-term negative impact of military spending on research and development.

Let me just elucidate a bit here by talking a little bit about a case study we did of the electronics industry, just to give you some ideas of the positive and negative effects of military spending on that specific industry.

Clearly, in the 1950's after the transistor was invented, the Defense Department played a rather important role in providing the demand for early, very expensive transistors. They helped develop transistors, along with, interestingly enough, the hearing aid industry. Vacuum tubes are big and it is sort of hard to get a vacuum tube in a hearing aid device, so they immediately saw a use for this. Defense for its own reasons, supported the technology—because of the belief that semiconductors would be more reliable and more compact, and they saw long-term applications in the defense industry. As a result, they provided a significant amount of demand for early transistors.

The same occurred after the development of the integrated circuits by Texas Instruments and Fairchild at the end of the 1950's through the Apollo program and the Minuteman III program which provided a substantial demand for semiconductors in that period, too.

The one thing the Defense Department, we found, was not very good at doing in that period, was subsidizing research and development efforts that led to the innovations. It was Bell Labs that created the transistor to begin with and it was then the commercial firms who developed the IC who were not getting a lot of research and development money from the Defense Department. Indeed, most of the research and development money was going to the older, larger vacuum tube firms that were not particularly innovative. As a result, the actual innovations that occurred in the semiconductor industry occurred outside of the purview of military R&D.

Now, that pattern has continued into the 1970's, and indeed, as we have seen the development of MOS technology and other semiconductor innovations, the Defense Department has played a role, albeit a smaller one nowadays, of providing demand because the civilian marketplace provides a substantial demand in the semiconductor industry.

But they have played, again, less of a research and development role in the innovative process, though they have certainly helped make the production process in the semiconductor area more efficient, process R&D work has been a positive effect of military spending.

Now, just a final note on this case. At the present time, as you are probably aware, the Defense Department is engaged in a significant program to try to develop very high speed integrated circuits. My view here is that there is some question as to whether or not this particular project is actually taking resources away from

technologies that the civilian sector might feel more important to competitiveness in the long run.

I think here we get into an issue of allocation of resources. Because of the specific demands of the Defense Department, the need for very highly performance-oriented semiconductors that can handle massive amounts of data and control the battlefield, the demands there are not very similar to the demands in the civilian sector, and as a result, you are devoting research and development that may not have much civilian impact.

Mr. ASPIN. Let me ask about the other part of the investment, the productivity side. In your study, you talk about the relationship between the percentage of GNP spent on defense and the amount spent on investment. This is a way of getting at the issue of productivity. Is that how you go about it?

Mr. DEGRASSE. There are two ways that you get at this issue of whether or not military spending affects productivity growth, it seems to me, is through looking at whether or not military spending has had an impact on—well, let's back up for a moment.

What are the ways that we might be able to increase productivity growth in the economy? How do we do what we want to do? One of the ways that we would think of doing that would be to increase investment. That is one of them.

To increase the efficiency of the production process—to increase—create new products that are somehow more attractive and, as a result, create more production. There are a number of different paths, larger factories, economies of scale. So there are a number of different pathways.

Now, our view is that the pathways that are affected by military spending are this research and development arena, where resources are diverted from the research and development arena that could have an effect on both new process improvements and product improvements in the economy, as well as the issue of investment, where the money is diverted in a macrosense in the economy through such problems as the level of interest rates.

So that is the way we would back into this issue of productivity growth. And certainly there are a variety of other factors that have to do with productivity growth. We did test a number of other theories.

We found that, in general, trying to test as carefully as we could the effect of civilian government expenditures on the economy, we found that we could not really find good statistical evidence to indicate that civilian government spending was the problem.

The United States, in terms of civilian government spending as its share of gross domestic product, is way down the list in comparison to other nations and the same in the area of transfer payments.

We also tested some other theories. The one that we think is most likely to also be an important explanatory variable is the fact that mature economies tend to grow more slowly. That is a very important explanatory variable.

There are many other theories, including the issue of whether or not management has been as effective as it could be, whether or not regulation has discouraged or encouraged investment.

I am not prepared to say that military spending has been the only reason or certainly the most important reason for the problems that we have experienced in economic growth. But I am willing to say this. That during the last 20 years the U.S. economy has not really been tested, either technologically or in terms of our productivity capabilities, by other nations.

We had tremendous leads as a result of the destruction that occurred as a result of the Second World War. We were in a position of dominance, and we were able to continue rather blithely with our production technologies and we did not experience the sort of competitive pressures that we are now experiencing as a result of moving more slowly.

I believe that the fact that we did move more slowly during the 1950's and 1960's is to some extent a result of higher levels of military spending.

The dilemma confronting us now is that as a result of higher military spending we have to face up to the priority question—is it going to be possible to undertake a substantial effort to try to expand or at least to maintain the level of our competitiveness vis-a-vis other industrial nations, or is the military buildup that we are undertaking going to undermine that effort to maintain productivity and to maintain our competitiveness?

I think that there is some reason to believe it will have a negative effect.

Mr. ASPIN. Let me ask a very specific question. There are a lot of ways in which you could pay for a buildup.

Mr. DEGRASSE. Yes.

Mr. ASPIN. You could tax people for it. Lots of different taxes. You could forgo some other expenditure. You could run up a deficit. There are lots of ways a military buildup can be paid for. It may or may not result in a reduction in investment expenditures.

But is it your experience, or do the data show, in fact, if you look at the buildups, say, the Korean buildup, the Vietnam buildup, our current buildup, or even the rather high level that we maintained between the buildups, that there is a loss to investment?

Mr. DEGRASSE. That is the point that comes clear through this cross-national assessment.

Mr. ASPIN. So what you are saying is that it need not result in a reduction in investment, but, in fact, in the real world it turns out that it does.

Mr. DEGRASSE. Or at least historically. Let's just say the data has shown that.

Mr. ASPIN. Let me pursue this question.

Mr. DEGRASSE. I am sorry. I want to say one thing more about investment historically. This is cross-nationally. Now, if you look at the United States and look at what effect a buildup has just in the components of our own GNP—what occurs at the time of buildups—you see that consumption is also rather significantly reduced.

But cross-nationally that doesn't seem to be as clear a case. The case seems to be clearer for investment to be affected by high military spending.

Mr. ASPIN. You mean we look at various comparisons with other countries?

Mr. DEGRASSE. With other countries. The comparison that stands out is that our investment is lower than other nations. Our consumption isn't necessarily lower.

Mr. ASPIN. Over time?

Mr. DEGRASSE. Over time in the United States if you look at specific buildups—Korea, Vietnam, the Second World War—the thing that stands out is that both investments and consumptions tend to be depressed rather dramatically.

Mr. ASPIN. Of course, in the short run you would think there would be an impact on consumption. Over the long run, it would be harder to sustain, unless it is backed by a tax policy or other regulation.

Let me pursue this. The Japanese spend less than 1 percent of their gross national product on defense. We are trending up to 7, if everything goes according to the Reagan plan, 7-plus percent of our gross national product on defense.

Is it fair to say that your position is that defense spending, that difference in defense spending, is some part of the explanation as to why we have less of a growth rate than Japan? It is not the only reason. It may or may not be the most important reason. But it is a reason.

Mr. DEGRASSE. I think it is clearer to say that in the 1960's, my belief is that that is one of the reasons why our productivity growth tended to slow down during that period. We see the drop in the growth in productivity occur before the oil prices came about. My view is that in the 1960's, particularly when after we had spent a significant portion of our gross domestic product on military spending during the 1950's and during the 1960's, I think we began to see the effects of the diversion of research and development efforts and the diversion of investment begin to accumulate and, as a result, it became harder for us to increase our productivity growth.

The 1960's is the clearest place that we can say military spending slowed economic growth. The question before us now is do we want to trend upwards again, do we want to be diverting resources?

In that period of time we were not particularly tested by the rest of the world. In this period of time we are in a period where we are going to be tested.

We do face some rather important challenges, and probably good for the economy. But the point is by increasing military spending now, I think it makes it much harder to address this agenda of revitalizing the economy.

Mr. ASPIN. How about the issue of the Japanese? Let me put it to you this way. One of the things that might be going on is that we just never had the challenge, and the challenge in and of itself will provide an increase in productivity and provide greater resources.

Here the United States is spending a fair amount of its gross national product on defense. One of the things, of course, it could do would be to increase the resources for both defense and investment if the United States was willing to reduce its consumption.

I mean in the old equation, GNP equals C, plus I, plus G. So you can reduce that C number and increase both the I and the defense part of G—if the American public were willing to reduce its standard of living.

Let me carry this further. You could both have the strongest defense in the world and increase the investment necessary to compete with the Japanese and Europeans. You could put money into both of those provided you were willing to reduce consumption. You do that, of course, with a deliberate government policy of taxation.

Mr. DEGRASSE. Let's remember for a moment why it is that businesses invest. Usually businesses invest for a variety of different reasons.

One of them would be to gain some sort of advantage, probably most importantly, to gain some sort of advantage over their competitors, in classic economic terms.

You are hoping to find some cost savings through your new investments.

Maybe that is just to garner a greater part of a—a larger part of a stable marketplace. But certainly investment is also very helpfully encouraged when a market place is growing.

The most important time when investment occurs is when you have demand. And unfortunately, when you cut consumption, is a very significant part of the demand for goods falls out of your economy.

As a result, there is very little incentive for investment, per se. So if you are going to design a tax policy that does deter consumption, that does have, then, an effect on your investment incentives, because there is less incentive for business to go out and try to capture markets, because the market is declining.

The other effect, just to mention this very briefly, is that if you believe that crowding out as a result of the deficit is not a particularly bad problem because of the fact that there are a lot of other people in the world who are very happy to give us their money, if we are willing to—if the U.S. Government is willing to pay them 12 percent, 13, 14 percent a year for their money, they are very willing to invest their money in the U.S. Government which they believe is not going to renege on its debts or stop that nice stream of interest payments, if you believe that that is going to relieve crowding out problems, then, the real issue that is raised is as a result of what happens to interest rates in this country.

Interest rates tend to rise, and as a result of interest rates rising, the dollar becomes a stronger currency in the international exchange markets and it becomes harder for us to trade abroad and much easier for the rest of the world to trade in the United States.

Now, if the other countries trade in the United States—and here I am coming to my point, they capture some of our consumption. We are seeing dramatically expanded trade deficits.

As a result of higher interest rates, stronger dollar, and much larger problems in our trading balance, you see consumption reduced, and as a result of reduced consumption there is less incentive again for American business to invest and to try to become competitive, because they are having a hard time trading abroad and their market at home is being reduced by imports.

So that is, I think, another way of looking at the effects of this deficit and a way of looking at why it is that investment is likely to be affected by this buildup.

Mr. ASPIN. Mr. Clark.

Mr. CLARK. One more question. Let me restate what I understand your emphasis is on the longrun growth point. I gather what you are saying is that if we look at a couple of snapshots in time, on an international basis, what we find is that there is a negative association between military spending and investment.

Mr. DEGRASSE. Yes.

Mr. CLARK. The higher is military spending, the lower is investment—looking at a snapshot in time, across 17 countries. At the same time, we also find that there is some relationship between investment and productivity.

Mr. DEGRASSE. Particularly in the 1960's.

Mr. CLARK. And the relationship is positive. The higher is investment, the higher productivity, or the higher the increase in real output. The question is, how do we square that with the experience here in the United States where we find, I think, that military spending as a percentage of GNP has tended to be high at the very time that the increase in real output has also been high. Conversely, military spending has tended to be quite low in the United States, as a percentage of GNP, at the same time that productivity increases have also been low. In the 1970's productivity increases were quite low. Military spending was also very low until the very end of the 1970's.

Now take a look at the earlier periods. It doesn't seem to make too much difference, the 1950's or the 1960's, we find military spending was often quite high as a percentage of GNP at the same time productivity increases were quite high, too.

Just looking at one country, we find the conclusion is quite different than if we were looking across 17 countries—with one country across time, the conclusion is quite different than if we look at 17 countries at one or two points in time.

Mr. DEGRASSE. I think that raises a number of very interesting issues. I think that that is a very good question. Why is it you get contradictory data?

Let's first back up for a moment to talk about how I see military spending affecting productivity growth. There are two ways.

Research and development and other scientific and engineering talent, and also investment, both play a role. Now, why is it that you see military spending decreasing in the 1970's and productivity growth decreasing in the 1970's?

Well, I think that one must look at this variable military spending, as having a lag effect. Diverting research and development talent doesn't tend to have an effect on commercial products for 4 to 8 years into the future.

So you have a lag there. And the same in some sense investment effects are lagged as well. So my view is that the effects that high military spending had on diverting research and development talent, diverting technological capabilities and investments in the 1960's tended to result in effects that were not seen for a few years.

What I would postulate is that there is a lagging of effect between the time in which the resources are diverted and the actual time that you see the impact occur.

We tried to wash out some of those effects by looking at the relationship over time and cross nations, because we think that that is

a better way of trying to get an indication of whether or not there is a relationship.

Because it is very hard to sort these variables out, and we were able to look at cross-nationally, say, if over an extended period of time you have high military spending, does that affect the productivity relationship?

We did try to do, as well as just simple correlations, we tried to do some regression analysis where we adjusted for other factors in the economy, such as the growth in the labor supply and, the maturity of a nation. There still seems to be some indication that during the 1960's military spending in nations with higher military spending, there tended to be lower productivity growth.

So my view is that you have to look at it over time to really be able to get a sense of the effect of these problems that I have mentioned on productivity growth.

Mr. CLARK. That isn't here, the additional findings over time?

Mr. DEGRASSE. Well, I am trying to think of whether or not I can——

Mr. CLARK. Maybe you could send it to us.

Mr. DEGRASSE. I am trying to think quickly about where you might be able to find the discussion of that within the paper. I think implicitly that is the way we designed the research. I think that that was the approach that we took, looking at it from that perspective.

What I have done, I guess, is basically elucidate on what I thought was implicit in the research, the design that was discussed in the testimony.

Mr. ASPIN. Thank you very, very much for very interesting testimony.

Mr. DEGRASSE. Thank you for the opportunity to be here.

Mr. ASPIN. Our next witness this morning is Seymour Melman. We welcome a gentleman with whom I have been on the platform for a long time. He has been writing, thinking, and lecturing on this subject for a long, long time. He is a man who really is a very great expert in the field—Seymour Melman, professor of industrial engineering at Columbia. He has written several books, and I guess a new book has just come out. Is that right?

Mr. MELMAN. It is called "Profits Without Production."

Mr. ASPIN. It sounds like what we are talking about. Go ahead.

STATEMENT OF SEYMOUR MELMAN, PROFESSOR, DEPARTMENT OF INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH, COLUMBIA UNIVERSITY

Mr. MELMAN. Mr. Chairman, I have submitted a statement entitled "The Economic Cost of a Permanent War Economy." I ask you to accept that for the record.

Mr. ASPIN. Yes. Without objection.

Mr. MELMAN. My testimony here will emphasize certain key aspects of that statement and they will be elaborated in some respects.

A 3-percent annual increase in output per person in the manufacturing industries—that is an increase of manufacturing productivity so measured—was long taken for granted, as though it were

a natural condition of American society. Economists and others were thus unprepared, by schooling or experience, to cope with the 1965–80 figures for the average annual rise of productivity per man-hour in manufacturing. For the United States, 2 percent; for West Germany, 5.2 percent; for Japan, 8.1 percent.

This is not to say that economists and others have been unaware of the importance of productivity levels and their rates of change. Output per man-hour has long been known to set a definite limit to the ability of a society to support with goods and services a given standard of living.

Also, the rate of increase in productivity has been a key factor in the historic ability of U.S. firms to absorb increases in wages and other costs. It enabled them to pay the world's highest wages for manufacturing occupations until 1975, while producing goods that were competitive in American and other markets.

In this analysis, I will dwell on long-term rather than short-term effects, especially with reference to the manufacturing industries. By long term, I mean the effects that derive from changes in production methods, as in plant and equipment. These are the enduring sources of major change in output per man hour, as against such fluctuating factors as morale, various conditions of the workplace, terms of collective bargaining and the like. The progressive introduction of new manufacturing equipment to replace less mechanized, less productive equipment, has been the sustaining and durable source of productivity growth.

It is possible to define a set of factors which, at the plant level, at the point of production of a manufacturing firm clearly control the growth of productivity.

It is important for this discussion that these factors were defined independently of the present subject matter, the present interest in productivity. Thus, in two books—"Dynamic Factors in Industrial Productivity" 1956 and "Decisionmaking and Productivity" 1958—I analyzed the controlling factors behind the major changes of productivity and the differences in productivity among manufacturing industries of major countries. Those analyses revealed the following factors as the ones that clearly spur productivity growth.

First, the presence of cost minimizing as a pervasive pattern within machinery producing industries. That means that the managements of machinery producing industries operate internally in a way to offset their cost increases by improving their productivity. When that pattern of operation prevails throughout the machinery producing industries, their product—namely, new machinery—is made available at prices which rise through time at a dramatically slower rate than the increase, for example, in the wages of industrial workers.

Hence, for the users of machinery, the price of new equipment appears progressively more attractive by comparison with the wages of labor.

A second factor is cost minimizing among the machinery users. As they attempt to meet cost increases by mechanizing their work, they automatically improve productivity.

Here I must emphasize that improvement of productivity appears nowhere in the profit and loss statement whose bottom line is treated as holy writ in the tradition of business enterprise and in

our schools of business. Productivity increase has, therefore, been a derived effect of the cost minimizing strategies of manufacturing managements—the better, of course, to maximize profit.

A third factor, resulting from pervasive cost minimizing, is that the wages of labor have tended to rise more rapidly than prices of machinery. That was a sustaining pattern during the very important century, 1865–1965.

A fourth factor is the availability of finance capital at modest interest rates—by that I mean no higher than 5 to 6 percent.

Fifth is the pursuit of research and development, not only into product, but especially into manufacturing methods. Here it is important to notice that high levels of research and development expenditures do not necessarily yield major increments in productivity. To achieve that end R&D must pay substantial attention to production methods.

The sixth point is the operation of a stable production system. Here stable means that in a statistical sense output is so operated as to vary within predictable and acceptable limits. A manufacturing plant or a shop or a whole system is stable when the variation in its output rate remains within those predictable limits.

Stable production limits the effect of all factors that interfere with the steady flow of work. As this interference is eliminated, the average level of output automatically increases. Hence the productivity of labor and the productivity of capital improve as an automatic result of the stabilization of output.

The seventh point: The presence of managements oriented to production. In the history of industrial capitalism a basic premise has been that wealth is not produced in the form of money, but in the form of real goods, real output. In that review money is only a symbol employed for convenience of exchange and other purposes, of increased wealth.

That classic assumption, which is of course found embedded in the works of great economists, ranging from Adam Smith to Karl Marx, is strongly modified in our time, as our schools of business have emphasized the making of money without the necessity to make goods.

I cited in a recent book the case of a former student who finished a long career as general manager of a major east coast shipyard. He was succeeded by a man who, on arriving in office, circulated a letter prepared for him by a series of bright MBA graduates. Its operative statement was: "And I remind you all that we are not here to make ships; we are here to make money."

As long as management was dedicated to making ships—or steel or cars or radios or clothes—their orientation focused attention on productive investment.

A final point. All these factors require the presence of a competent infrastructure—meaning as ordinarily understood, the sufficient availability in the wider community of power, transportation, communications and allied supportive facilities, including housing and education.

I will refer back to certain of these factors in the latter part of this statement.

I want now to turn to a third consideration, the economic characteristics of a military budget that are significant for their effect on

productivity. The first of these is that military goods and services produce nothing useful for consumption or for further production. This point requires us to examine a fundamental consideration in our understanding of economy.

Economists normally understand an economic good or an economic product to be anything that has a price. It should be noted that that way of defining an economic profit does not derive from some divine authority or temporal law. It is wholly man-made. Other modes of understanding an economic good are entirely feasible. Thus, it is possible to understand economic goods as products and services that are serviceable for consumption as ordinarily understood or are useful for further production.

In order to appreciate the consequences of a military economy, it is crucial to turn to this latter mode of understanding an economic good, for then one sees immediately that both the broad and the detailed consequences of military production of all classes have special effects for productivity and, by implication, for employment and economic growth.

On a macro basis, the cost to a whole community of military activity is threefold. First are the resources directly consumed by military enterprise. We might consider the military budget as a money valued approximation of that expenditure. A second, social cost, and it is only a social cost, is the quantity of goods and services for consumption and for further production that are foregone when resources are used for this unique set of activities—which unlike the others yield no use value for consumption or further production. It is as though by the criterion of economic good that denotes usefulness for consumption or for further production, there is no product in the case of military production.

That absent product can be given a money value for estimating purposes equal to the money value of the resources that were the inputs for the military enterprise. And there is a third cost to the whole society, and that is the absence of marginal productivity of capital.

In the case of products that can be used for further production, there has historically been a pattern of gradual improvement in the efficiency of mechanisms and their mode of use. And that has, therefore, yielded increments of productivity of labor, increments of productivity of capital. But as the product of military economy does not yield usefulness for further production, that marginal productivity of capital effect cannot derive from the military production. Thus, a nuclear powered submarine or a modern fighter plane is a technological masterpiece, but neither can be used for further production.

And a second consideration, following from this first one, is that the activity carried on for the military enterprise is not an average slice of all goods and services. It is not an average slice for two reasons: first, the absence of those consumption and production use values, and, second, the resources which, taken together, are set in motion by a military budget constitute a capital fund, a military budget is a capital fund.

By capital, I mean production resources and by capital fund, I mean the ordinary understanding of capital in an industrial enterprise where there is fixed and working capital. Fixed capital de-

notes the money value of land, buildings, and equipment and the working capital denotes the money value of all the other resources, including manpower, raw materials and the like that are required to set the enterprise into productive motion.

Accordingly, a comparison of the military budget to the GNP has the interesting effect of blurring one's understanding of the meaning of the military budget as a capital fund that preempts production type resources that are vital for all nommilitary production.

The GNP denotes the net money value of all goods and services of whatever kind that are produced in a given period. The GNP is a helpful category for analyses of money flows with the economy—apart from the presence or absence of consumption or production use values among the price values of goods and services.

Furthermore, the military numerator as compared to the GNP denominator, is not an average slice out of the GNP. It is uniquely a set of resources which, taken together, have the quality of capital resources for production. Therefore, the ratio of military to GNP, which is widely used by our economists, tends to conceal more than it reveals. It is characteristically a small number—recently it has been given as 5 percent of the GNP; at present it is 7 percent. Note, however, that there is an error of estimate in these calculations of GNP which, however small, is appreciable as part of 5 percent.

Furthermore, denoting the military to GNP ratio as 5 or 7 percent has led a number of analysts to conclusions similar to those of Leslie Gelb in a study he prepared for the Carnegie Endowment for International Peace. Mr. Gelb concluded that the military budget increases planned by the Reagan administration, since they would add about 1½ percent to the ratio of military to GNP, were more a matter of political taste than of economic choice. How could serious people fly into a great flurry over a mere 1½ percent of this enormous, multitrillion total of the GNP?

For all these reasons, I would call attention to another way of appreciating the magnitude of the military budget. View it as a capital fund, then compare it to a civilian capital fund, and we introduce an interesting category that lends itself to my purpose. It is called the Gross Domestic Fixed Capital Formation, a statistic ordinarily included in national income accounts and compiled for many countries by a section of the United Nations. It provides us with what I think is a highly informative comparison; namely, the number of dollars expended for military capital for every $100 expended for new civilian capital in a series of countries. The last available data are for 1979.

In the United States, I estimate that for every $100 of gross fixed capital formation we expended $33 separately for the military. In the United Kingdom it was $32; France, $26; Sweden, $23; West Germany, $20; and Japan, $3.7. The difference is sharp between the United States and the Western European—continental—economies; between the United States and Japan it is really dramatic. And that difference in the use of capital resources goes far to account not only for the high productivity growth in those countries, as compared to the United States, but to the quality of the industrial plant and equipment that emerges in those societies, and their abil-

ity in the last decade to produce a rapid flow of high quality, modestly priced industrial goods, consumer goods, and capital goods.

I presume that in this chamber there would be a special interest in the ratio for the U.S.S.R. Unfortunately, the statistical data available from the U.S.S.R. are not homogeneous with those of the countries of the West. I have, however, prepared an estimate which I am prepared to stand by until the Soviets themselves publish appropriate official data. My judgment is that in 1979 for every $100 of civilian new capital formation in the Soviet Union, they expended $66 worth on the military.

Finally, in this connection, I call attention to a forecast for the United States which I regard as of fundamental importance for the purposes of this hearing.

We now have a formal estimate of the military budget planned for 1988. By extrapolating from previous data, I have made an estimate of the gross fixed capital formation that might be expected in that year and it leads me to believe that in 1988, the United States, given present plans and previous record, will be expending for every $100 of civilian fixed capital formation, $87 on behalf of the military enterprise.

Taking note of that development, I now find it necessary to conclude that, inasmuch as the Pentagon has been granted major increased control over capital resources during the 1980's, the prognosis for industrial productivity, and for industrial competence generally in the United States, is somber.

I turn now to a further way in which the military enterprise has a major effect on productivity, and that is through the decision process, or what is sometimes called the microeconomy, that prevails in the military enterprise. By the military enterprise, I mean an organization that extends from the central administrative office in the Pentagon down to and including the 37,000 firms that are prime contractors for the U.S. Department of Defense.

As I noted earlier, the practice of cost minimizing played a crucial, an indispensable role in the productivity process of the United States during the century 1865–1965. It is, therefore, of greatest importance that on all available evidence the microeconomy prevailing within the military enterprise of the United States is that of cost maximizing, coupled with subsidy maximizing.

This is not the result of explicit intent. There is no banner across the entrance in the Pentagon or the gates of any military industrial firm bearing the motto "Thou shalt maximize cost." Rather, as we learned in detail from the recent evidence made public on the cost of military spare parts, what seemed to be outrageous increases in prices derive from the normal application of the accounting rules and procedures recommended by the Department of Defense, the Armed Services Procurement Regulations and the host of allied manuals and standards that specify accounting and related practice.

This has profound importance for the whole industrial system. For the practice of cost maximizing—it is not called that in fact, it is not designated, but it is there and the term describes the procedure—the presence of that cost maximizing in so many firms, including those often cited by parties in the U.S. Government as

29-794 O—84—6

models for the rest of the system, has the effect of pressing the manufacturing system as a whole away from cost minimizing.

Indeed, a detailed study by Dr. Byung Hong, entitled "Inflation Under Cost Pass-Along Management," Praeger Publishers, 1979, identifies the mechanism by which the pressure to move away from cost minimizing has led to a new model for operating manufacturing enterprise in the United States. It is the practice of passing along cost increases to price rather than the traditional attempt, by internal means of every sort, to raise productivity in the firm, thus offsetting cost increases and minimizing price increases. The Department of Defense has played a crucial role in effecting this change.

My fifth point here is to note the effects of military economy on productivity growth. I select from among the factors that I identified earlier as spurring productivity growth four in particular. One is the rising cost of labor in relation to machinery. There is clear evidence that that classic pattern has ceased to exist in crucial areas of the U.S. industrial system. Thus I found, noted in the earlier work, "Dynamic Factors in Industrial Productivity," that for the period 1947–50 wages of labor rose more rapidly than prices of the crucially important machine tools, the class of equipment used throughout manufacturing industries.

Later studies indicated that until the mid 1960's, the rate of average hourly earning increase and the rate of increase in prices of machine tools tended to be about the same, looked, indeed, like a cost pass-along pattern. However, by the 1970's, the relationship had been transformed. From 1971 to 1978, average hourly earnings in the manufacturing industries, that is of production workers, rose 72 percent in the United States, while machine tool prices rose 85 percent.

The consequences were far reaching. There was a withdrawal of incentive for purchase and replacement of machine tools, and by 1977, the United States had the oldest stock of metal working machinery of any industrialized country in the world. The productivity consequences of that obsolescence are necessarily negative.

It is noteworthy that during that same period, 1971–78, wages in West Germany also rose 72 percent, but machine tool prices there rose only 59 percent. Hence, there was some substantial incentive to users of metal-working machinery to acquire new equipment.

In the case of Japan, the situation is yet more striking. From 1971 to 1978, average hourly earnings in manufacturing rose 177 percent, and the prices of machine tools produced in Japan rose 51 percent. That is precisely the historic pattern which in the United States encouraged the purchase of new production equipment and thereby automatically spurred the growth of productivity. That process has now been checked.

Consider next the factor of finance—that is, the availability of new finance capital at a modest interest rate.

For sheer quantity, it is striking that in every year from 1952 to the present day, the budget of the Department of Defense, a capital fund, exceeded the total net profits of all U.S. corporations, including the ones serving the Department of Defense. Hence, in terms of quantity of finance capital, the Department of Defense has had by far the larger amount.

I turn then to the matter of R&D, where it is interesting to compare the engineers and scientists functioning in an economy per 10,000 persons in the labor force. That ratio is perhaps a better category than engineers and scientists engaged in research and development, because the broader group includes those engaged in designing and operating the manufacturing processes, production engineers, or scientists seeking solutions to important production problems.

So, number of engineers and scientists per 10,000 of the labor force in 1965 showed the following: In the United States, 64.1; in Japan, 24.6; and in West Germany, 22.6.

By 1977, these relationships had been transformed. For that year, I estimated the number of engineers and scientists in civilian activity per 10,000 in the labor force. And the result is the following: United States, 38; Germany, 40; Japan, 50. That is not to say that the United States did not have at that time a larger gross number of engineers and scientists functioning in the society, but the intensity of their use on behalf of the civilian economy was substantially less than in the case of Japan, somewhat less than in the case of West Germany.

It is also important to see the way in which research engineers and scientific talent have been available to and used in military as against the civilian parts of the manufacturing industry. Thus, in 1970—I regret it is the last year of available data—the military serving manufacturing industries employed an average of 7.4 scientists and engineers in research and development for every 100 production workers. For the civilian serving industry, which is the larger part of manufacturing, the percentage was 1 percent.

I am aware that especially starting with the 1960's, an energetic effort has been, made first by NASA, then by the Department of Defense, and then by both, to urge upon the American community the idea that there has been a spinoff from the research and development undertaken on behalf of the general military and space enterprise, or funded by them, and that this spinoff was an important factor in justifying the continuance of their control over and disposition of large R&D resources. Therefore, I call attention to the fact that an inquiry undertaken for the Commerce Department into the possible percentage of spinoff from military research expenditures has found that perhaps 5 percent but not more than 10 percent of spinoff may have resulted from each military research dollar.

In the matter of infrastructure I call your attention to the conclusion independently reached by the Council of State Planning Agencies in 1981 when it published a study called "America in Ruins," a title which to my knowledge has not heretofore been used in our country. The lead text of that report stated:

> America's public facilities are wearing out faster than they are being replaced. The maintenance of public facilities essential to national economic renewal has been deferred. Replacement of obsolescent public works has been postponed. New construction has been cancelled. The deteriorated condition of basic facilities that underpin the economy will prove a critical bottleneck to national economic renewal during this decade unless we can find ways to finance public works.

This larger conclusion covers myriad detail of collapsing bridges, burst water mains, unclean water supplies, incompetent sewage disposal systems, closed libraries, underfunded public schools, pot-

holed city streets, a railroad system in shambles that have come to characterize the infrastructure of American communities.

That is not a competent infrastructure to underpin or support a manufacturing system that, in terms of productivity, in terms of cost and price competition, is part of the modern world.

I further call attention in point 6 of my prepared statement to the limits on civilian economy and productivity that derive from concentration of capital on the military enterprise. There I have made available a reprint of an article that I wrote for the New York Times of July 26, 1981, titled "Looting the Means of Production."

The article shows three columns of data, the first identifies a military item, hence, a capital item. The second column identifies its approximate money cost. The third column identifies a civilian capital item of approximately equal money cost.

Seven percent of military outlays from fiscal year 1981 to 1988 would amount to $100 billion. That would be the cost of so rehabilitating the U.S. steel industry that it would be again the most efficient in the world.

The cost overruns to 1981 on the Navy's Trident and Air Force's F-16 programs jointly amount to $33 billion; that is equivalent to the money that would be needed to rehabilitate and reconstruct one out of five U.S. bridges.

The Navy's F-18 fighter program estimated recently to cost $34 billion, would be the price for modernizing America's machine tool stock to bring it to the average level—meaning the average age—of Japan's machine tool stock.

The MX missile system's estimated first cost is $34 billion, and that is what it would take for a comprehensive 10-year energy efficiency effort to save 25 percent to 50 percent of U.S. oil imports.

The cost overrun to 1981 on the Navy's F-18 aircraft program, $26.4 billion, would be the cost of electrifying 55,000 miles of main line railroads and the cost of new locomotives as well.

The implication of these comparisons is this: An economy that opts for column 1—hence the military capital list—is necessarily unable to have the civilian capital list.

The question often raised is the feasibility of enlarging civilian productive investment by reduction of civilian consumption. Numerous articles and certain monographs have supported this possibility on the basis of analyses of money flows in the conventional national income categories.

I put it to you that it is an unrealistic proposal, that it implies a transferability of resources that does not exist. Thus, a reduction in the number of employees in Pittsburgh's fast food shops, brokerage firms, banks, real estate offices, would yield not the slightest gain of capital resources, not even working personnel, competent to reinstitute first class production methods in the now-decayed steel mills around Pittsburgh. Resources constituting capital are stated in money terms for convenience of count, of aggregation. But it is misleading, utterly illusory, to suppose that the money category used for capital resources, as for consumer goods, implies thereby the transferability of the physical resources from consumer to capital goods.

Seven, I call attention here to the direction of effect of military economy on productivity. With respect to the list of factors that I identified earlier as spurring productivity growth, the evidence in hand is that the sustained operation of a military economy has a negative effect in every instance. Hence, it necessarily must have negative effect on productivity growth.

Finally, I note the consequences for industrial competence and for employment. In a recent volume titled "Profits Without Production," I presented on page 200, the percentage of U.S. consumption produced abroad in several important classes of goods. These data are for 1979-80 and are consistently understated in each instance where the data are less than 100 percent.

So, 27 percent of the automobiles purchased in the United States were produced abroad; 25 percent of the machine tools; 15 percent of the steel mill products; 87 percent of black and white TV sets; 47 percent of calculating machines—handheld; 39 percent of calculating machines—desk top and printing; 22 percent of microwave ranges and ovens; 16 percent of communications and equipment; 35 percent of integrated microcircuits; 24 percent of X-ray and other irradiation equipment; 74 percent of motion picture cameras; 51 percent of sewing machines—domestic. That last figure was for 1978; it's now 100 percent.

Tape recorders and dictation machines—office type—100 percent; apparel 20 percent; leather gloves 37 percent; footwear—nonrubber—45 percent. The meaning of these percents of U.S. consumption of imported goods is that they incur approximately the same percentage reductions in employment opportunity in those industries in the United States.

On recent visits to Pittsburgh I learned that in 1980 the United States Steel Corp. employed 28,000 steelworkers in that area; in 1983 they employed 8,000. The New York Times of December 5, 1983, contained an announcement that United States Steel Corp. was planning a further series of plant reductions, that other steel-producing firms had similar plans and that the result would be another 10 percent reduction in the capacity of U.S. steel output.

The list is distressing; the numbers are large, and they refer not to temporary recession unemployment, but to permanent unemployment, the consequence of closing and dismantling production facilities.

In all of this I have not attempted to suggest that the conditions of the military economy and its normal functioning are sole sources of pressure for diminished productivity growth in the United States. Indeed in "Profits Without Production," I gave elaborate attention to the changes in the character of management that have become economywide and which have a very important bearing on the problem.

But it is crucial for this discussion that the effects from the military economy are negative with respect to each element that traditionally has enhanced productivity.

It is not possible from this analysis to state what proportion of the decline in rate of productivity growth is traceable to the military, but it is utterly clear that the military have made a decisive contribution to that process through the withdrawal of capital and through the negative effect on the series of other factors that had

once spurred productivity growth in the manufacturing industries of the United States.

Thank you for your attention to these remarks, Mr. Chairman.

Mr. ASPIN. Thank you, Professor Melman.

[Testimony resumes on p. 99.]

[The prepared statement of Mr. Melman follows:]

PREPARED STATEMENT OF SEYMOUR MELMAN

1. Since production is the source of wealth, and since a community must produce in order to live, the most fundamental economic consequence of a permanent war economy is its effect on production capability. A permanent war economy is an economy in which military activity is a major and continuing activity, while the military product is counted as an ordinary part of the economic product of the society.

2. The history of industrial capitalism in the United States, as elsewhere, has included grave problems of instability, a succession of expansions and contractions in economic activity. These crises of economy, however, have characteristically been crises of the financial superstructure of the system, including problems of investment financing or adequacy of demand for either consumer or durable goods. During the long history of American industrial capitalism the production competence of U.S. industry has never been at issue. Even during

the Great Depression there was no suggestion that the means of production were other than fully competent to produce goods of acceptable quality and price.

During the 1980s, however, the technical-economic competence of American industry has become a focal point of defect as numerous manufacturing industries become progressively incapable of producing goods at quality and price to be acceptable even in the U.S. domestic market.

3. Efficiency in production, defined most crucially by productivity--average output per person employed--is closely affected by the quality and quantity of resources (capital) that are available for production, and by the decision criteria that control their use. Accordingly, I have attempted to summarize here three principal aspects of the impact of a permanent war economy on production capability: first, capital resources used for the military economy; second, the effect of a permanent war economy on productivity; and third, the effect of the permanent war economy on technical-economic competence.

4. Capital resources used for military budgets. In ordinary industrial management usage, capital is conventionally understood as composed of "fixed" and "working" capital. The "fixed" component includes land, buildings and machinery. The

"working capital" component comprises the tools, fuel, raw material, purchased components, and working hours of every sort required to conduct production on a sustained basis. Military budgets are important in relation to fixed and working capital because a modern military budget sets in motion precisely the sorts of resources ordinarily understood as the capital of modern industry. A modern military budget is capital fund.

From 1946 to 1980 the Department of Defense budgets totalled $2,001 billion. The planned DOD budgets from 1981 to 1986 are $1,600 billion. One way of appreciating the magnitude of resources involved here is to compare the sum of military budgets, $3,601 billion from 1946 to 1986, with the money value of the reproducible national wealth of the United States (as of 1975), $4,302 billion. This latter sum refers to the money value of everything man-made on the surface of the United States, all structures, machinery, public and private facilities, business and personal inventories. The money value of the land is not included here. The sum of military budgets 1946-1986 is a quantity of resources amounting to about 83 percent of the estimated money value of everything man-made on the surface of the United States. Stated differently, the military budgets have preempted resources approximately equivalent to those required for renewing the largest part of what man has wrought in

the U.S. in terms of physical facilities and tangible goods of all sorts.

Another way of appreciating the size and effects of U.S. military budgets is by comparing the military budgets of the United States and other countries with some indicator of major new capital resources in an economy. For this purpose we can contrast the military budgets of a single year with the gross fixed capital formation achieved by economies during the same period. The latter category is a measure of all new civilian (private and public) structures, machinery and equipment added to an economy during a given year.

For 1979 (last year of available data compiled by the U.N.) we observe that for every $100 of gross fixed capital formation in the United States, $33 was separately expended for military purposes. The ratios of military spending for each $100 of new fixed capital formation were:

U.K.	32	(W) Germany	20
France	26	Japan	3.7
Sweden	23	USSR	(66-my. estimate; no UN data)

Within the American economy access to capital resources is limited for industrial managements by their ability to wield finance capital, the money representation of production resources. We are indebted to President Eisenhower for calling attention,.

in his Farewell Address of January 17, 1961, to the fact that "We annually spend on military security more than the net income of all U.S. corporations." From 1951 to that date the annual budget of the Department of Defense had, each year, exceeded the net profits of all corporations. That has continued from 1961 to 1981. Hence, the federal managers of the U.S. military economy have wielded, for thirty years, the largest single block of finance capital resources in the American economy.

5. This concentration of capital resources in behalf of military economy necessarily limits their availability for civilian economic purposes of every sort. Two conditions control this effect. The first is a limitation conferred by nature itself: materials or energy used in one place cannot, at the same time, be available at another place. A second limitation derives from the character of the products of military economy: whatever other usefulness may be assigned to them, military products do not add to the ordinary goods and services of consumption or to capability for further production.

The consequence for capital availability for civilian use is illustrated in the accompanying article "Looting the Means of Production" that first appeared in The New York Times on July 26, 1981. The first column of the illustrative materials of this ar-

ticle identifies particular military programs. The second column notes all or part of their cost as of mid-1981. The third column identifies industrial facilities, or supporting infrastructure facilities, of equivalent money value, that is, requiring equivalent capital resources.

The use of capital resources for the military projects defined in column 1 precludes the possibility of constructing the industrial and allied plant and equipment identified in column 3.

6. The effect of a permanent war economy on productivity. For a century prior to the mid-1960s, industrial output per person employed in U.S. manufacturing industry tended to increase at about 3 percent a year. This was a direct consequence of the sustained use of industrial capital to increasingly mechanize industrial work. So long-enduring was this pattern that a 3 percent rate of industrial productivity growth came to be identified as virtually inherent in American economy. By 1965 this condition was transformed. Here are the average annual rates of productivity growth thereafter:

1965-70	2.1 percent
1970-75	1.8 percent
1975-80	1.7 percent

These were not only the lowest annual rates of productivity growth recorded for American manufacturing but also the lowest rates of productivity growth in any major industrialized country

for which data are available. Here is the comparison of average annual rates of growth in manufacturing industry productivity from 1965 to 1975 in the following countries:

	1970-75	1965-70
Belgium	8.2	6.8
Canada	3.0	3.5
France	3.4	6.6
Germany	5.4	5.3
Italy	6.0	5.1
Japan	5.4	14.2
Netherlands	5.8	8.5
Sweden	4.4	7.9
Switzerland	3.5	6.2
United Kingdom	3.0	3.0
United States	1.8	2.1

We have already accounted for the fact that in Japan and Germany as contrasted with the United States, capital resources have been used with emphasis for civilian economic use. The low and declining rates of U.S. productivity are a direct reflection of the lessened use of capital for the mechanization and other modernization of industrial work.

7. The declining rate of annual productivity growth in U.S. industry has also been vitally affected by the changed character of the decision rules governing the mechanization of work. While many factors surely affect output per person employed

in industry, considerable evidence supports the understanding that average output per person is most directly controlled by the degree of mechanization of work and the accompanying organization of production.

The mechanization of work in U.S. industry had long been governed by the continuing effort of U.S. industrial managers to minimize their costs of production, the better to maximize profit. In the effort to minimize production costs, U.S. industrial managers typically had the opportunity to replace direct manual effort by machine production. This replacement was spurred by the fact that prices of machinery had long tended to rise at a lesser rate than wages of labor. This important effect was obtained as the managers of U.S. machinery-producing industries themselves strove to minimize their costs. Thus as these managers responded to increasing costs, like wages of labor, with efforts to offset them by improving their own efficiency, they were able to offset all or part of the cost increase. Therefore they did not have to increase prices of their machinery products to the same degree as the wages of their workers. For the users of machinery, this meant a sustained pattern of advantage in shifting from manual to machine performance of work. The consequence was automatic increase in productivity per person in manufacturing.*

---

*None of this is to say that other factors do not affect production competence or productivity. These include the training,

morale, work competence and work traditions of the labor force, the presence of a long-term, as against a short-term, planning tradition among managers, the readiness of managers to invest in domestic industry rather than to seek investments abroad--and other factors--are surely involved. However, studies in many industries and work operations have shown that major productivity changes are the direct effect of the mechanization of work, in turn controlled--in cost-minimizing firms--by the relative cost of labor to machinery. This factor (and immediately associated variables) has been shown to account for about 78 percent of the observed variability in industrial productivity among major countries during the first half of this century. See S. Melman, Dynamic Factors in Industrial Productivity, John Wiley, 1956.

---

8. This classic pattern that had induced productivity growth in U.S. manufacturing was abridged during the 1960s as the cost minimizing mechanism was altered by the institutionalization of a new decision maker, the federal government and its Department of Defense, functioning as the effective central administrative office managers of 37,000 industrial firms or parts of firms (i.e., prime contractors).

The military establishment developed a sustained pattern of purchasing on a cost-plus basis. Also, the Department of Defense under Robert McNamara institutionalized a series of practices,

like historical costing and concurrency in production scheduling which had the automatic effect of inducing rapid cost and price increases for the industrial products produced to their specifications.

The practice of historical costing has meant: noting the average price of a product during a period of years, calculating the average trend line for that development, and then extrapolating that trend to the time when a new product would be purchased. (Engineering costing--comparative analysis of alternative designs and production methods for a product to discover the least cost method--was excluded.) Historical costing became a system for escalating cost and price.

Concurrency has meant performing ordinarily successive functions--product development, design, testing, and production--in parallel. Thereby low-reliability products are produced which require substantial and costly retrofitting.

As these and related methods were made preferred and characteristic practices in military-serving industry, the tradition of cost-minimizing was displaced by an effective pattern of cost-maximizing. Insofar as this penetrated the machinery-producing industries, the results have included severe abridgment or termination of the traditional cost-minimizing process.

By the 1970s the results were plain enough. Here are the percent changes in the hourly earnings of industrial workers com-

pared to changes in machine-tool prices from 1971 to 1978:

	Worker Earnings per Hour	Machine Tool Prices
United States	+72	+85
Germany	+72	+59
Japan	+177	+51

These crucial data show that in Germany and in Japan machine tool prices advanced far less than the wages to industrial workers. In those countries the classic cost incentive favoring the further mechanization of work continued, with special strength in the case of Japan. The Japanese pattern during the 1970s closely resembled the development in the United States during the first half of this century that had spurred productivity growth.

In the United States, however, the 85 percent increase in average machine tool prices, exceeding the 72 percent rise in worker earnings, marked the close of the classic process that had induced industrial productivity growth in the United States. In response to this new pattern, that reflected a cost-maximizing rather than a cost-minimizing style of managerial decision making, the users of American machine tools responded as one might expect. They proceeded to purchase fewer new machine tools, and of those that they did buy, an increasing proportion were purchased outside of the United States. During the 1970s the metal-

working industries of the United States operated the oldest stock of metalworking machinery of any industrialized country. By 1980 25 percent of the machine tools purchased in the United States were imported.

9. There has been a further effect of the military economy, with far-reaching consequences for the viability of civilian production in the United States. During the 1960s and 1970s there has been a shift in the position of the United States, notably in relation to Germany and Japan, with respect to the number of scientists and engineers serving civilian industry per 10,000 in the labor force. By 1977 the data were as follows:

United States	38
Germany	40
Japan	50

This means that, as compared with the United States, a larger proportion of the available population of scientists and engineers in Germany and Japan, notably the latter, were functioning in the service of civilian product design and civilian production.

10. Effects on the technical-economic competence of U.S. industries. The normal functioning of the American military economy has withdrawn technical brains and hands, capital for production, and incentive for productivity growth from American civilian industry. Unter these conditions, it should be no surprise

29-791 O—84——7

that many American firms become progressively less able to hold market position in the face of competition from outside the United States(notably those firms endowed with less imaginative, less venturesome and less production-oriented managements). By 1978-79 U.S. production of many classes of goods had been displaced by production performed abroad, especially in Western Europe and the Far East. The following is a sample of commodities with the indicated proportion of imports as a percent of U.S. consumption during 1978-79.

	Percentage of U.S. Consumption Produced Abroad
Automobiles	26.7
Machine tools (1980)	24.6
Steel mill products	15.4
TV sets, black and white	87
Calculating machines, hand held	47
Calculating machines, desk top and printing	39
Microwave ranges and ovens	22
Communications systems and equipment	16.3
Integrated microcircuits	33.8
X-ray and other irradiation equipment	24.3
Motion picture cameras (1977)	74

Sewing machines	51
Tape recorders and dictation machines, office type	100
Bicycles	22
Apparel	18.7
Leather gloves	37
Footwear (non-rubber)	45
Flatware	50.1

The percentages of production once performed in the U.S. translate directly into permanent loss of productive livelihood for the people of these industries.

Since the elemental task of an economy, any economy, is to organize people to work, it is evident that the military economy of the United States is an anti-economy. Independently of intention, the military economy of the U.S. disables the competences ordinarly required for the conduct of economic life.

11. The military budgets planned for 1981-1986 will accentuate each of the causal factors that has produced the decay of technical-economic competence in many U.S. industries.

12. There are no grounds for supposing that these developments can be reversed without a reversal in the causal conditions which have brought them about. The capital and technical talent that have been preempted for the military economy must be converted to civilian use in an orderly conversion process. The cost-maximizing pattern of military economy, with its erosion of elemental production competence must be replaced or deterioration beyond repair will be created.

In the long history of industrial capitalism the trade unions have been accustomed to dealing with employers who organized production as a basic way to increase their wealth. But the private employer, in the American model, has become more interested in short-term profit and mobility of finance capital; hence, making money, not goods. Meanwhile the state managers have stressed their military economy that produces power-wielding instruments - but nothing that can be used for consumption or further production.

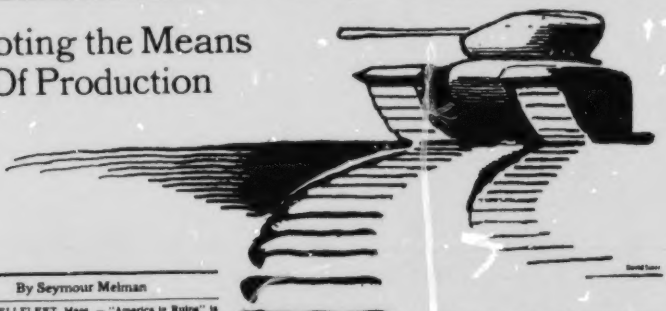
For two centuries we have operated industry under a great social contract: management was accorded the power of decision and a large share of the income; in return workers and community expected managers to organize work. That social contract has been broken.

It is now left to working people and their trade unions to devise new ways of organizing work. Therefore trade union organization for economic conversion is a vital step in this new direction.

The issues of peace and economy are now joined.

THE NEW YORK TIMES, SUNDAY, JULY 26, 1981

Looting the Means Of Production



By Seymour Melman

SOUTH WELLFLEET, Mass. — "America in Ruins" is both the title and forecast of a 1981 report by the Council of State Planning Agencies, an organization of the planning and policy staffs of the nation's governors. The Council finds major deterioration in parts of the country's infrastructure — that is, vital services such as clean water, reliable transportation, efficient ports, and competent waste disposal, which are indispensable underpinnings for an industrial system. The report finds — as any traveler on United States railroads knows — that "the maintenance of public facilities essential to national economic renewal has been deferred."

Simultaneously, the means of production of United States industry have been deteriorating.

Production incompetence, now endemic, is spreading fast, not only in the well-publicized case of automobile firms but also in the following industries: steel, machine tools, radio and television manufacturing, railroad equipment, precision optics, fine cameras, men's shoes, flatware, hi-fi electronics, etc., etc., etc.

As private and public managers become better at making money without making economically useful goods, a new issue finally will have to be confronted: Will American industry reach a condition of "no return," making the achievement of industrial renewal problematic?

The way that an economy uses its capital — its production resources — is a crucial determinant of its productivity and economic well-being.

By 1977, for every $100 of new (producers') fixed capital formation, the United States applied $48 to the military economy. In Japan, the ratio was $2.70 for the military. The concentration of Japan's capital on productive economic growth goes far to explain the current success of that country's industry, where productivity grew 6.2 percent in 1980. By contrast, with the United States' aging machinery stock, the average output per person in manufacturing industry decreased 0.5 percent in 1980.

The United States has "achieved" its present state of industrial deterioration by assigning to the military economy large quantities of machinery, tools, engineers, energy, raw materials, skilled labor, and managers — resources identified everywhere as the "fixed and working capital" that is vital for production.

Since a modern military budget is used to purchase such resources, it is, effectively, a capital fund. A large ratio of military to civilian capital formation drains the civilian economy. The viability of the United States as an industrial society is threatened by the concentration of capital in a fund that yields no product useful for consumption or for further production. This looting of the means of production on behalf of the military economy can only be accelerated as a consequence of the unprecedented size of the war budgets advocated by the Reagan Administration.

Seven percent of the military outlays from fiscal 1981 to 1986	= $100 billion	= the cost of rehabilitating the United States' steel industry so that it is again the most efficient in the world
The cost overruns, to 1981, on the Navy's Aegis-cruiser program	= $6.4 billion	= the comprehensive research-and-development effort needed to produce A- to 100-mile-per-gallon cars
The cost overruns, to 1981, on the Navy's current submarine, frigate, and destroyer programs	= $43 billion	= for California, a 10-year investment to spur solar energy for space-, water-, and industrial-process heating; this would involve 370,000 new jobs and lead to vast fuel savings
Sixty-three percent of the cost overruns, to 1981, on 30 current major weapons systems	= $110 billion	= the 20-year cost of solar devices and energy-conservation equipment in commercial buildings, saving 3.7 million barrels of oil per day
The cruise-missile programs	= $11 billion	= the cost of bringing the annual rate of investment in public works to the 1960 level
Two B-1 bombers	= $400 million	= the cost of rebuilding Cleveland's water-supply system
Cost overruns, to 1981, on the Navy's Trident and the Air Force's F-15 programs	= $93 billion	= the cost of rehabilitating or reconstructing one out of five United States bridges
The Navy's F-15 fighter program	= $34 billion	= the cost of modernizing America's machine-tool stock to bring it to the average level of Japan's
Seventy-five percent of the cost overruns, to 1981, on the Navy's 5-inch guided-projectile program	= $283 million	= President's Reagan's proposed fiscal 1981 and 1982 cuts in the Northeast rail-corridor improvement programs, and in the alcohol-fuels development program
Two nuclear-powered aircraft carriers	= $6.4 billion	= the cost of converting 77 oil-using power plants to coal, saving 300,000

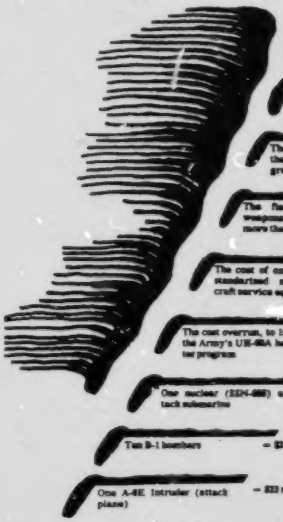
The vital resources that constitute a nation's capital fund cannot be enlarged by waving a budgetary wand. Neither can manufacturing facilities be multiplied by ever richer subsidies to the managers of military industry. Basic machinery, skilled labor, engineers and scientists — all are finite in number and difficult to increase.

The concentration of capital on the military portends sharply diminished opportunity for a productive livelihood for most Americans. Clearly, a choice must be made as to where these resources will be used.

The accompanying list of trade-offs illustrates the kinds of choices that the Reagan Administration and the Congress are now making with their budget and tax plans, intended or not.

The following are principal sources of these data: military-program and unit costs, and cost changes (overruns), the Department of Defense "SAR Program Acquisition Cost Summary (Unclassified)," Dec. 31, 1980, and related reports, and "Procurement Programs (P-1)", March 10, 1981; and news media reports. The civilian capital-cost data range from reported prices (machine tools, buses, trolleys) and reported Federal budget items to informed estimates of industrial-research and project costs and of costs of public works. Economic and engineering estimates are from Representative Les Aspin (Congressional Record, April 27, 1981), Prof. John E. Ullmann of Hofstra University; Mark Bipp, a Columbia University doctoral candidate; the Council on Economic Priorities, the city of San Diego, and the California Public Policy Center.

Seymour Melman, professor of industrial engineering at Columbia University and national co-chairman of the peace organization SANE, is author of "The Permanent War Economy" and is writing a book, "Profits Without Production."



		Sources of the per day
Eighty-eight percent of the cost overrun, to 1981, of the Navy's Tomahawk cruise missile	= $444 million	= President Reagan's proposed fiscal 1981 and 1982 cuts in the Federal solar-energy budget
Three Army AH-64 helicopters	= $90 million	= 100 top-quality, energy-efficient electric trolleys (made in West Germany)
One F-15A airplane	= $30 million	= the cost of training 200 engineers to design and produce electric trolleys in the United States
48 Army heavy (XM-1) tanks	= $1.36 billion	= 300 top-quality city buses (West German-made)
The cost overrun, to 1981, on Navy frigates (FFG-7)	= $8 billion	= the minimum additional amount in investment needed to prevent water pollution in the United States from exceeding present standards
The cost of unjustified non-combat Pentagon aircraft	= $8.4 billion	= six years of capital investment that is needed to rehabilitate New York City transit
The cost overrun, to 1981, on the Army's heavy-tank (XM-1) program	= $13 billion	= the shortfall of capital needed for maintaining water supplies of 100 United States cities for the next 30 years
The MX missile system, first cost	= $34 billion	= the cost of a comprehensive 10-year energy-efficiency effort to save 20 percent to 30 percent of United States oil imports
Reactivating one World War II mothballed battleship	= $370 million	= President Reagan's fiscal 1981 and fiscal 1982 cut in energy-conservation investment
The cost overrun, to 1981, on the Navy's F-18 aircraft program	= $20.4 billion	= the cost of electrifying 30,000 miles of mainline railroads, and the cost of new locomotives
The fiscal 1981 nuclear-weapons funding, adding to more than 30,000 now on hand	= $6.5 billion	= eight years of capital needs for rehabilitating New York City's sewers
The cost of excessive, non-standardized military aircraft service equipment	= $300 million	= President Reagan's fiscal 1981 and fiscal 1982 reduction in capital grants for mass transit
The cost overrun, to 1981, of the Army's UH-60A helicopter program	= $4.7 billion	= the annual capital investment for restoring New York City's roads, bridges, aqueducts, railways and buses
One nuclear (SSN-688) attack submarine	= $565 million	= the cost of 100 miles of electrified rail right-of-way
Ten B-1 bombers	= $5 billion	= the cost of dredging six Gulf Coast and Atlantic Coast harbors to handle 150,000-ton cargo vessels
One A-6E Intruder (attack plane)	= $33 million	= the annual cost of a staff of 300 to plan mutual reversal of the arms race, and conversion of the military economy to a civilian economy

Mr. ASPIN. Let me ask you this, in what sense is the military different from other Government spending in the problems you point out, particularly of the loss of capital that could otherwise be spent on producing goods or helping productivity?

Mr. MELMAN. If you build a dam, for example, you can produce something with it—hydropower, electricity that can be used for consumption or for further production.

Mr. ASPIN. Right. You say defense is neither—leads to neither consumption nor further production.

Mr. MELMAN. That is correct.

Mr. ASPIN. Isn't it a form of consumption?

Mr. MELMAN. It is a form of using up.

Mr. ASPIN. Yes, but it is using up for something that society collectively decides that it wants to do. It is defending the country. That is something society wants to do. Maybe it is too much, but it is a decision made through the political process to expend a certain amount of resources toward some end.

Mr. MELMAN. Yes.

Mr. ASPIN. In that sense it seems to me to be consumption.

Mr. MELMAN. You are correct in the sense that military serving activity has certain military utility, usefulness. Of course it does. It has political usefulness. It has military usefulness. To some persons it has esthetic usefulness. To others even religious usefulness. But it doesn't have the economic usefulness that we ordinarily understand as consumption. That is to say, a house to live in, clothes to wear, food to eat, and entertainment to enjoy.

That could be made very concrete, Mr. Chairman. Consider the Bureau of Labor Statistics listing of items which it measures for the Consumer Price Index, CPI. That is my consumption list. Military goods and services do not appear on that list. You wouldn't expect them to, would you?

Mr. ASPIN. What?

Mr. MELMAN. You wouldn't expect them to.

Mr. ASPIN. No, no; but wouldn't it also be—it seems to me it would be similar to some other kinds of Government spending such as, say, the police department. In what way—isn't spending on the military similar to the police department? The police department doesn't appear in the Index either. It is not the sort of thing you normally consume, it is not housing, food, clothing, but it is something that people buy through their Government as a form of security.

Maybe they are spending too much on police, maybe not enough, but it seems to me it is a similar expenditure.

Mr. MELMAN. The police forces are used for domestic and law compliance, law enforcement.

The Armed Forces are used in international competition by threat of use, or by actual use, to overpower an opponent and to impose political will. Before World War II the Armed Forces of the United States—apart from the war periods themselves—the Armed Forces of the United States took a modest quantity of resources, however measured. A standing army of 100,000 or 200,000 was characteristic of the period.

For the aggregate economy, with military production at a modest level, there was no issue of major preemption of capital resources,

with major consequence on the manufacturing system, major consequences on productivity.

That was transformed after the Second World War as the use of resources for the military enterprise became large and sustained; hence, the title of my prepared statement, Mr. Chairman, The Economic Cost of a Permanent War Economy.

By a permanent war economy, I mean an economy in which military production is sustained, is large, and is ordinarily treated as part of the economic end product, as part of the GNP, a treatment that has obscured the effects of the military economy on the quantity and quality of capital resources available for civilian industry.

Mr. ASPIN. I understand. The issue of course is its size realtive to other things.

I am just asking from the standpoint of an economic analysis. Are there not other Government expenditures which in form are very much like military expenditures? Maybe they are nowhere near as large, but it seems to me that——

Mr. MELMAN. If you go to the national parks, we see the park rangers, don't we?

Mr. ASPIN. Yes.

Mr. MELMAN. The park rangers are a form of police.

Mr. ASPIN. Yes.

Mr. MELMAN. As we know, the park rangers also have many other duties, don't they? They look after conservation, look after the well-being of the conserved area. But this police, like the others use only minor amounts of capital resources.

The military have some fragment of civilian type activity. The Coast Guard fishes yachtsmen out of the waters. The Army Corps of Engineers has a certain number of activities that are supposed to spur waterway transportation. But those are a trifling part of the $2,089 billions of military budgets projected from 1981 to 1988.

Mr. ASPIN. But the fundamental cost in each of these cases, I would say, is peace of mind, security, whatever you want to call it. That is why you buy a police force; that is why you buy an army; that is why you have a court system; that is why you have an FBI.

Leaving aside the issue of whether we spend more or less on these things, it seems to me what we are buying there is essentially the same thing. It is not what you normally think of as a consumer good. It is not a house, not clothing, not food. It is not what we would buy on our own. But it is the sort of thing with that we buy through collective action of Government, because we feel it fulfills a need for this kind of stability in our lives and a kind of protection.

You are protecting yourself with the police department from internal threats of having your house robbed or being mugged and other things. Perhaps we are not doing it well, but that is why you buy the police. In the case of an army, you are buying it for protecting the country against invasion.

To be sure, police can be misused just as the army can be misused. It can do a lot more than what people want it for—to protect them. But basically, a free people decide to buy a police department or an FBI or a court system, I would say, for reasons similar to those for which they decide to buy a military establishment.

Mr. MELMAN. That is a marvelously optimistic view of the functions served by the present armed forces. First, U.S. Armed Forces cannot deliver defense or, as you called it, protection. There is no shield in a physical sense any longer. Once nuclear weapons became available in quantity and could be delivered with diverse vehicles, defense ceased as a military function as among the nuclear armed states. The only place where defense is left in the name of the Government department. The main remaining military function is the ability of U.S. Armed Forces to coerce smaller states, and support preferred sides in civil wars—as in El Salvador.

Second, peace of mind? It is precisely because of the character of modern weaponry and armed forces that peace of mind has gone into grave disrepair. Thus, there is not much peace of mind with respect to the prognosis of nuclear war. The recent experience is massively supportive of that.

Thus, the display of a modest representation of the facts about military weapons now in place—I call the ABC film "The Day After" a modest representation or understatement—did not yield peace of mind in the populace. It yielded grave disquiet. Hence, the traditional assumption about buying security, peace of mind does not stand.

Mr. ASPIN. But I would contend that I can find a—you have a rather healthy skepticism about the role of military in a modern society. I can find you some constituents in the inner city that have a very healthy skepticism about the role of a modern police force in an industrial society that would make similar statements about the perversion of the use of a police force.

Mr. MELMAN. Mr. Chairman, I agree.

Mr. ASPIN. Right.

Mr. MELMAN. But that doesn't take away in the slightest from the economic consequences that flow from the operation of a continuing, massive military economy.

Mr. ASPIN. No, it does not; it does not. I think your overall basic point may be essentially correct about the impact of the size of it. I wouldn't pick out defense as the only problem, but the size of it makes it the most important.

Tell me about the spinoffs. What was that? There was a study you cited about a 5 percent or 10 percent effect—a Department of Commerce study?

Mr. MELMAN. Yes. In a moment I will have the citation for you. This is dealt with in two places. One, a paper by Dr. Michael Boretsky, titled, "Trends in U.S. Technology: A Political Economist's View," in the Journal of American Scientist, January 1975. Second, there is a volume by Granville W. Hough, titled, "Technology Diffusion," published by Lomand Systems, Mount Airy, Md., 1975, page 47.

Mr. ASPIN. And the general conclusions—we will look them up. We want to follow the issue further.

But what they concluded was that in fact there was the spinoff of—the spinoff was very small, 5 or 10 percent.

Mr. MELMAN. Perhaps 5 percent, but not more than 10.

Mr. ASPIN. When they say spinoff, what are they referring to?

Mr. MELMAN. Civilian usefulness of results of military funded research.

Mr. ASPIN. As measured by dollars or measured by numbers of products or what?

Mr. MELMAN. I believe that was gaged in estimate of dollar magnitude.

Mr. ASPIN. OK. Very interesting. Questions?

Mr. FAZIO. I would like to try one area of questioning. You place heavy emphasis in terms of reduced rate of productivity increase in recent years on our inability to innovate and to keep the decreasing cost of machine tools constant with the increasing cost of labor.

Society today seems to be focusing on the requirements that labor accept less for its efforts. We are going through a number of very difficult labor-management periods in many of our basic industries, not only in jobs being eliminated but wages being reduced and benefits being cut back.

Would you comment on the propensity we seem to have to overemphasize the costs of labor in terms of our international competitiveness?

You didn't provide much data along those lines, but I am sure the implications of what you said would lead us to believe that you think we have vastly overemphasized the comparative costs of labor.

Mr. MELMAN. Until 1975, the United States paid the highest average hourly earnings per production worker in manufacturing of any country in the world. After 1975, that was transformed as the countries of Western Europe developed economically and proceeded to pay progressively higher wages to their industrial workers.

Thus, the hourly full cost to managements—that means money and nonwage costs—for industrial workers in 1980 were the following among countries: United States, $10; Denmark, $10.44; Germany, $12.26; Luxembourg, $11.81; the Netherlands, $12.17; Norway, $11.29; Sweden, $12.51; and Switzerland, $11.15.

In a word, by 1980, the United States became a medium-wage industrial country.

How was it possible, as during the 1950's, for the U.S. auto industry to pay two to three times the wage of Western Europe and, at the same time, produce cars that were the cheapest in the world measured in price per pound? How could it pay the highest wages and produce the least expensive product?

It was possible because of the sustained attention that had been given in the U.S. auto industry to the mechanization and collateral organization of work such that the productivity of labor and capital, was sufficient to offset the U.S. wage.

That is the crucial meaning for productivity growth, and for price competitiveness and for employment, that adheres to the classic pattern of cost minimizing. Industrial management in the United States was until about 1965 cost-minimizing in character, excepting even there the military economy.

I cite the case of wages because it is so widely discussed and because it plays a crucial role, and because the evidence of a whole industrial century is that the United States paying the highest wages in the world by producing goods that were acceptable in quality and in price. Nothing has happened in the physical uni-

verse to make it impossible to continue that sort of process. What has changed is in the social universe, in the economic universe.

The microeconomy of cost minimizing, which still occupies an honored place in every economic textbook I have seen, is in fact virtually nonexistent except for a scattering of firms that might comprise 5 percent of the industrial system.

Ask yourself if you could identify a single product which during the last decade or so has been reduced in price. Remember it was once the case that when new products were introduced, they would typically cost x the first year and then it was x minus something in successive years. So cost and price reduction were once a characteristic pattern of mass production industry.

In recent years, the only products that can be identified as having that character are the hand-held calculator, computers—especially measured in terms of cost or price per unit of capacity—ball pens, and contact lenses. I have been seeking out examples of any other products, manufactured product, that fell in price. Reduced cost and price once was characteristic of manufactured goods. I will give you a further example. One of the most important products of a modern manufacturing industry is electric power. It is a capital good. It is used everywhere by the rest of the system.

During the first two-thirds of this century the price of electric power to industrial users in the United States declined year after year, and I mean in current dollars. How was it possible to have the price of electricity diminish in cost as the input factors—wages, salaries, fuel, machinery, structures—increased in price? It was possible because efficiency in the conduct of the production enterprise was sufficient to offset all of these cost increases.

The argument made recently and currently that the high wages of labor and what makes U.S. industry noncompetitive falls before the Scottish legal verdict—not proven—in view of the substantial weight of evidence to the contrary.

What has happened is something else. The character of industrial management has changed. Private managers are hell bent to make money instead of goods as a general characteristic. Their modal condition has shifted from cost minimizing to cost passalong. The State managers, centered in the White House and the Pentagon operate the military economy—with its 37,000 firms, very large budgets, and built-in institutionalized regulations—to maximize cost and subsidies in the service of their power wielding. That is visible at every turn.

Mr. ASPIN. Thank you very much. Dr. Melman, we appreciate your being here. We appreciate your testimony very much. Thank you.

Mr. MELMAN. You are most welcome.

Mr. ASPIN. The task force will recess until 4 o'clock this afternoon.

AFTERNOON SESSION

Mr. ASPIN. We will reconvene our hearings here this afternoon. We are honored to welcome a very important witness this afternoon, Rudolph Penner, the new Director of the Congressional Budget Office. We welcome you here, sir.

Why don't you proceed?

STATEMENT OF RUDOLPH G. PENNER, DIRECTOR, CONGRESSIONAL BUDGET OFFICE, ACCOMPANIED BY LAWRENCE R. FOREST, ANALYST, NATIONAL SECURITY AND INTERNATIONAL AFFAIRS DIVISION, CBO

Mr. PENNER. Thank you very much, Mr. Chairman. I am pleased to appear before you today to discuss the economic outlook and the influence of rising defense budgets on that outlook.

In the first concurrent resolution on the budget for fiscal year 1984, the Congress provided for annual real growth in defense budget authority of 5 percent a year through 1986. CBO's most recent economic forecast, released last August, assumed these defense increases and the other fiscal policies of the first resolution. Our forecast projects continued growth in the economy and moderate inflation for one or possibly 2 years, despite Federal deficits that are very large by historical standards.

Earlier administration budgets have proposed even more defense spending and less nondefense spending than provided in the resolution. Additional emphasis on defense would, of course, promote defense-intensive sectors of the economy at the expense of others, but CBO believes the economy could accommodate such shifts without significant adverse effects on macroeconomic variables such as employment and long-term productivity gains.

Thus, the choice of a mix of defense and nondefense spending must depend on a political judgment about whether added defense spending contributes enough to national security to justify its direct cost. That is not to say its indirect costs are not extremely important in that decision.

From the economic standpoint, the question is not the desired level of defense spending but how it is financed: Whether by running higher deficits, by reducing Federal nondefense spending, or by increasing taxes.

DEFENSE NEED NOT REKINDLE INFLATION SOON

In 1983 the economy has grown briskly, at about an average pace for a cyclical recovery, and inflation has been moderate. We expect further noninflationary growth for another year or two.

Specifically, CBO projects that real gross national product will be up about 6 percent in 1983—fourth quarter 1983 over fourth quarter 1982—and about 4.5 percent in 1984. That growth, in our opinion, will help lower civilian unemployment from an average rate of about 9.5 percent in calendar year 1983 to about 8 percent in 1984. Unemployment last month already was down to 8.4 percent.

The recovery has not rekindled inflation, and we expect prices to continue rising only moderately during 1984. Our forecast shows inflation edging up from about 4.5 percent in 1983 to about 5 percent in 1984. The small rise projected for 1984 reflects increases in social security taxes, assumed declines in the foreign exchange value of the dollar, some strengthening of weaker labor markets, and partial recoveries in prices of some basic commodities, principally foods and fuels. The forecast does not foresee acceleration of inflation in large numbers of markets or industries.

Sharp increases in defense spending could increase inflation if they contributed to bottlenecks in major industries. But our projections suggest this is unlikely. In 1984 and 1985, capacity use in major defense-intensive industries—which are primarily manufacturing industries—is expected to be well below peak rates achieved in years when inflation was accelerating.

In aerospace and shipbuilding, for example, we project that capacity use in 1985 will reach 83 percent, compared with 91 percent both in 1979 and in 1966 during the Vietnam period. In manufacturing as a whole, we project that capacity use in 1985 will just reach its historical average of 83 percent, below peak rates of 86 percent in 1978 and 91 percent in 1966.

Capacity use will remain below peak rates even though the economy is recovering somewhat faster than we anticipated earlier this year. Indeed, in the sectors most strongly affected by defense, such as aerospace and shipbuilding, we now project slightly lower capacity use than we did in our February 1983 forecast. This stems from the slower growth in defense spending proposed by the first budget resolution. In most other sectors—which depend predominantly on nondefense business—we see higher capacity use. For example, we now foresee much higher capacity use in the iron and steel industry, but still far from levels that suggest bottlenecks.

Early in the new year, CBO will revise its forecast to reflect recent economic events and final congressional action on the 1984 budget. Among other things, the Congress cut about $5 billion from the first budget resolution's 1984 target for defense budget authority.

The economic outlook for the next year or so appears favorable despite Federal deficits that are high by historical standards. The first budget resolution called for spending cuts and tax increases that would reduce deficits substantially.

Under that resolution, CBO projected that the deficit would be about $180 billion in fiscal 1984 and $140 billion in 1986. The high-employment deficit would stay near $100 billion.

But these estimates assumed legislative actions that would substantially cut deficit levels below those implied by current law. As things now stand, deficits will remain near $200 billion through 1986.

DEFICITS POSE THE LONGRUN RISK

The risks of sparking inflation or high interest rates would increase sharply if the economy recovered faster than we forecast. Suppose, for example, that real GNP in 1984–86 expanded at 5 percent a year. Then, in 1986, unemployment would fall below 7 percent. And capacity use in manufacturing would move into the 85 to 88 percent range, comparable to rates achieved in the 1973–74 and 1978–79 periods of higher inflation.

Of course, these risks have to do with overall budgetary policy, not just defense. Even if defense budget authority for 1984 to 1986 were to have no real growth over the 1984 level—rather than the 5 percent assumed here—unemployment, capacity use, and the deficit would not change dramatically.

Capacity use in manufacturing, for example, would be about 1 percent lower in 1986. Unemployment rates would probably not change more than small fractions of a percent. The 1986 deficit would fall about $15 billion.

This is not to argue that defense, which under our projections will account for about 30 percent of total Federal outlays in 1986, should escape careful scrutiny. All spending needs close scrutiny, especially in a period of fiscal stringency.

THE ECONOMIC IMPACT OF HIGHER DEFENSE SPENDING

My testimony thus far has focused on the defense spending plans and other policies assumed in the first concurrent resolution. The administration may, as it did in its January 1983 budget, propose higher defense spending and less nondefense spending. In certain industries, higher defense spending would pose risks of spot shortages that could drive up weapons prices. But higher defense spending would not greatly affect overall employment. Nor should higher defense spending significantly retard gains in productivity.

WEAPONS COSTS

Rapidly growing defense spending could cause spot shortages in some industries that focus heavily on defense. Last February we projected that, to satisfy defense and nondefense demands, production in 36 of 100 industries—in the four-digit standard industrial classification—would have to rise to unusually high levels by 1986. Unusually high means more than one standard deviation above the industry's trend production.

These 36 narrowly defined industries are predominantly in the areas of aerospace, specialty metals, electronics and instruments, and metal fabricating, particularly forgings. Our forecasts anticipate gradual increases in their capacity.

However, large capacity increases might occur in the face of sharply higher demand, and to the extent that they did, the potential for spot shortages would be less than we have forecast.

In any event, such spot shortages probably would have minimal effects on the overall economy, but they might have effects on weapons costs. The 36 defense-intensive industries mentioned above accounted for only 3.7 percent of GNP in 1981, but their defense production represented almost 40 percent of total defense purchases from industry.

The above analysis is based on the administration's January 1983 budget plan and CBO's February forecast. Since then, the Congress has cut 1984 defense spending authority, while the economy has grown faster than we anticipated. We will update our forecast in coming weeks, but we do not believe that doing so will significantly change the analysis.

EMPLOYMENT EFFECTS

Some critics of increased defense spending argue that it will have adverse effects on employment. But this argument does not find much support in economic research. In the long run, total employ-

ment seems to be determined primarily by the size of the labor force.

In the short run, large econometric models suggest that increases in overall defense or nondefense spending on goods and services have about the same effect on total employment. Simulations using the models of Data Resources Inc. and Wharton Econometric Forecasting Associates bear this out. These same models predict somewhat smaller shortrun employment gains from tax cuts or increases in Federal transfers.

Recent economic analysis suggests that more Government spending financed by higher Government debt may not increase aggregate employment as much as shown by the models for three reasons. First, as economic activity begins to expand in the sectors stimulated by increased Government spending, interest rates begin to rise if money growth is held constant. This can crowd out other forms of economic activity and employment. In monetarist theory, the offset is almost complete within a very short time period.

Second, the same interest rate increase attracts foreign capital which, under flexible exchange rates, bids up the value of the dollar and decreases employment in export industries and in industries competing with imports.

Third, the deficit has recently reached such alarming proportions that further increases could raise fears regarding the long-term health of the U.S. economy; this could inhibit business from making the long-term investments so necessary to continued economic growth. The negative impact on investment could, in other words, be greater than that which would be expected to result from normal "crowding out."

The economics profession is now in the midst of an intense debate as to whether standard models reflect these phenomena adequately. Whatever the outcome of this debate, it is unlikely to affect the comparison between the employment effects of defense and nondefense purchases. All the theories find that shifts between defense and nondefense purchases have only negligible employment effects.

More generally, it should be noted that many forms of defense spending have very similar counterparts in the nondefense budget. It would be surprising if the construction of aircraft runways had macroeconomic effects very different from the construction of highways; or if an increase in military retired pay had effects very different from an increase in social security; or if increased Pentagon hiring had effects different from increased employment in nondefense departments of the Government.

PRODUCTIVITY GAINS

There is one major difference between the defense and nondefense budgets viewed as a whole. Defense budgets are more heavily weighted toward purchases of goods and services and relatively light on transfer payments.

Economists often refer to Government purchases of goods and services as being "exhaustive," that is to say, as directly depriving the private sector of labor and material resources. This does not argue against such purchases if the Government can put the re-

sources to public uses that are more efficient than their private uses.

Transfer payments, on the other hand, are not exhaustive. They simply transfer the power to buy goods and services from one group to another. They may, as a side effect, create disincentives to work and save, thus indirectly reducing the supply of productive resources to the private sector, but the size of this effect is a matter of great controversy.

There is no doubt, however, that increased purchases of goods and services caused by higher defense spending would decrease productive resources available to the private sector.

In the short run, higher defense spending could also slow commercial research and development, an important factor in productivity gains. In the longer run, effects of defense spending on productivity growth should be negligible.

Productivity gains in the private sector could be adversely affected if increases in defense purchases draw off or begin to exhaust R&D resources. Defense spending demands a disproportionate share of scientists and engineers working on R&D.

In 1981, defense spending amounted to about 6 percent of GNP but used about 25 percent of all such scientists and engineers. Thus, a sharp rise in defense spending could, in the short run, reduce the number of skilled R&D workers available in the nondefense sector and hence slow commercial R&D and productivity.

In the long run, a shift toward more defense spending would probably have negligible effects on productivity growth. As the wages of scientists and engineers rose, any shortage should be offset as colleges and universities provided more graduates.

Moreover, defense production sometimes yields innovations benefiting private sector productivity and possibly stimulating derivative innovations in the private sector. Examples of defense-supported developments benefiting private productivity include jet engines and computers.

CONCLUSION

Nothing in my testimony should obscure the fact that defense spending imposes a major cost on the economy. It clearly deprives the private sector and the nondefense public sector of resources that could be used for other productive purposes. It is up to the Congress to decide whether this cost is necessary in order to enhance our national security.

Moreover, this testimony did not examine whether the resources consumed by the defense effort are being used in the most efficient manner possible. That is to say, the analysis did not ask whether the same degree of national security could be purchased with fewer resources than are consumed by current spending levels or whether, with some change in the composition of spending, more national security could be purchased with the same total expenditure.

Our analysis does suggest that, if national security requires, the economy can support the defense buildup envisioned in the first budget resolution. Under that buildup, defense in 1986 would consume about 7 percent of GNP, a level well below the peacetime highs achieved since World War II. Moreover, the economy can sus-

tain this buildup with little risk of rekindling inflation, at least in the next few years.

The analysis also strongly suggests that in making difficult decisions about defense spending, the Congress need not be concerned that a given increase in defense purchases will have a very different impact on employment, inflation, or other macroeconomic variables than an equal increase in nondefense purchases. Everything that we know suggests that, within the range of the options now being proposed, the effects are similar.

Whatever the level of defense spending, a key question for the economy is how to pay for the buildup. Ultimately, the Congress must pay for it by reducing resources devoted to other areas—taking them either from the private sector through increased taxes or from the public sector through further reductions in nondefense spending, or both. The longer the Congress continues to finance the buildup through growing Federal deficits, the greater the risk of slowing longrun economic growth.

Thank you very much, Mr. Chairman.

[Testimony resumes on p. 123.]

[The prepared statement of Mr. Penner follows:]

PREPARED STATEMENT OF RUDOLPH G. PENNER

Mr. Chairman, I am pleased to appear before you today to discuss the economic outlook and the influence of rising defense budgets on that outlook.

In the First Concurrent Resolution on the Budget for Fiscal Year 1984, the Congress provided for annual real growth in defense budget authority of 5 percent a year through 1986. CBO's most recent economic forecast, released last August, assumed these defense increases and the other fiscal policies of the first resolution. Our forecast projects continued growth in the economy and moderate inflation for one or possibly two years, despite federal deficits that are very large by historical standards.

Earlier Administration budgets have proposed even more defense spending and less nondefense spending than provided in the resolution. Additional emphasis on defense would, of course, promote defense-intensive sectors of the economy at the expense of others, but CBO believes the economy could accommodate such shifts without significant adverse effects on macroeconomic variables such as employment and long-term productivity gains. Thus, the choice of a mix of defense and nondefense spending must depend on a political judgment about whether added defense spending contributes enough to national security to justify its direct cost.

From the economic standpoint, the question is not the desired level of defense spending but how it is financed: whether by running higher deficits, by reducing federal nondefense spending, or by increasing taxes.

DEFENSE NEED NOT REKINDLE INFLATION SOON

Outlook Favorable in Next Year or Two

In 1983 the economy has grown briskly, at about an average pace for a cyclical recovery, and inflation has been moderate. We expect further noninflationary growth for another year or two.

Specifically, CBO projects that real gross national product (GNP) will be up about 6 percent in 1983 (fourth-quarter 1983 over fourth-quarter 1982) and about 4-1/2 percent in 1984. That growth, in our opinion, will help lower civilian unemployment from an average rate of about 9-1/2 percent in calendar year 1983 to about 8 percent in 1984. Unemployment last month already was down to 8.4 percent.

The recovery has not rekindled inflation, and we expect prices to continue rising only moderately during 1984. Our forecast shows inflation edging up from about 4-1/2 percent in 1983 to about 5 percent in 1984. The small rise projected for 1984 reflects increases in Social Security taxes, assumed declines in the foreign-exchange value of the dollar, some strengthening of weaker labor markets, and partial recoveries in prices of some basic commodities, principally foods and fuels. The forecast does not foresee acceleration of inflation in large numbers of markets or industries.

Sharp increases in defense spending could increase inflation if they contributed to bottlenecks in major industries. But our projections suggest

this is unlikely. In 1984 and 1985, capacity use in major defense-intensive industries--which are primarily manufacturing industries--is expected to be well below peak rates achieved in years when inflation was accelerating (see the table). In aerospace and shipbuilding, for example, we project that capacity use in 1985 will reach 83 percent, compared with 91 percent both in 1979 and in 1966 during the Vietnam period. In manufacturing as a whole, we project that capacity use in 1985 will just reach its historical average of 83 percent, below peak rates of 86 percent in 1978 and 91 percent in 1966.

Capacity use will remain below peak rates even though the economy is recovering somewhat faster than we anticipated earlier this year. Indeed, in the sectors most strongly affected by defense, such as aerospace and shipbuilding, we now project slightly lower capacity use than we did in our February 1983 forecast. This stems from the slower growth in defense spending proposed by the First Budget Resolution. In most other sectors--which depend predominantly on nondefense business--we see higher capacity use. For example, we now foresee much higher capacity use in the iron and steel industry, but still far from levels that suggest bottlenecks.

Early in the new year, CBO will revise its forecast to reflect recent economic events and final Congressional action on the 1984 budget. Among other things, the Congress cut about $5 billion from the first budget resolution's 1984 target for defense budget authority.

Outlook Favorable Despite Large Deficits

The economic outlook for the next year or so appears favorable despite federal deficits that are high by historical standards. The first budget resolution called for spending cuts and tax increases that would reduce deficits substantially. Under that resolution, CBO projected that the deficit would be about $180 billion in fiscal 1984 and $140 billion in 1986. The high-employment deficit—that is, the deficit calculated at 6 percent unemployment—would stay near $100 billion.

But these estimates assumed legislative actions that would substantially cut deficit levels below those implied by current law. As things now stand, deficits will remain near $200 billion through 1986.

DEFICITS POSE THE KEY LONG-RUN RISK

Deficits of this magnitude do not provide a permanent means of financing spending increases, and they threaten to crowd out private capital formation. We now borrow to cover not only some of the expenditures on current programs but also to finance the interest bill on the outstanding federal debt. The ratio of federal debt to GNP is soaring, and if interest rates remain constant the interest bill will also rise faster than GNP. This clearly cannot go on forever. More immediately, we face the risk that federal debt will displace private debt and equity holdings in the market for funds, thereby decreasing investment in productive capital. Ultimately we

have no choice but to raise taxes or to cut spending by enough to bring the budget sufficiently near balance to stabilize the debt-to-GNP ratio. Not facing up to this problem now only postpones the inevitable.

Deficits also may complicate countercyclical monetary policy. For example, the Federal Reserve could respond to large deficits and heavy government borrowing by increasing growth of the money supply to curb rising interest rates, thereby fueling inflation. Or—what seems more likely, given Chairman Volcker's statements—it could restrain growth in money to fight inflation, thereby risking sharp increases in interest rates.

The risks of sparking inflation or high interest rates would increase sharply if the economy recovered faster than we forecast. Suppose, for example, that real GNP in 1984-1986 expanded at 5 percent a year. Then, in 1986, unemployment would fall below 7 percent. And capacity use in manufacturing would move into the 85-88 percent range, comparable to rates achieved in the 1973-1974 and 1978-1979 periods of higher inflation.

Of course, these risks have to do with overall budgetary policy, not just defense. Even if defense budget authority for 1984 to 1986 were to have no real growth over the 1984 level—rather than the 5 percent assumed here—unemployment, capacity use, and the deficit would not change dramatically. Capacity use in manufacturing, for example, would be about 1 percent lower in 1986. Unemployment rates would probably not change more than small fractions of a percent. The 1986 deficit would fall about $15 billion.

This is not to argue that defense, which under our projections will account for about 30 percent of federal outlays in 1986, should escape careful scrutiny. All spending needs close scrutiny, especially in a period of fiscal stringency.

THE ECONOMIC IMPACT OF HIGHER DEFENSE SPENDING

My testimony thus far has focused on the defense spending plans and other policies assumed in the First Concurrent Resolution. The Administration may, as it did in its January 1983 budget, propose higher defense spending and less nondefense spending. In certain industries, higher defense spending would pose risks of spot shortages that could drive up weapons prices. But higher defense spending would not greatly affect overall employment. Nor should higher defense spending significantly retard gains in productivity.

Defense Bottlenecks May Raise Weapons Costs

Rapidly growing defense spending could cause spot shortages in some industries that focus heavily on defense. Last February we projected that, to satisfy defense and nondefense demands, production in 36 of 100 industries (in the four-digit Standard Industrial Classification), would have to rise to "unusually high" levels by 1986. (Unusually high means more than one standard deviation above the industry's trend production.) These 36

narrowly defined industries are predominantly in the areas of aerospace, specialty metals, electronics and instruments, and metal fabricating, particularly forgings. Our forecasts anticipate gradual increases in their capacity. However, large capacity increases might occur in the face of sharply higher demand, and to the extent that they did, the potential for spot shortages would be less than we have forecast.

In any event, such spot shortages probably would have minimal effects on the overall economy, but they might have effects on weapons costs. The 36 defense-intensive industries mentioned above accounted for only 3.7 percent of GNP in 1981, but their defense production represented almost 40 percent of total defense purchases from industry.

The above analysis is based on the Administration's January 1983 budget plan and CBO's February forecast. Since then, the Congress has cut 1984 defense spending authority, while the economy has grown faster than we anticipated. We will update our forecast in coming weeks, but we do not believe that doing so will significantly change the analysis.

Employment Impacts

Some critics of increased defense spending argue that it will have adverse effects on employment. But this argument does not find much support in economic research. In the long run, total employment seems to be determined primarily by the size of the labor force.

In the short run, large econometric models suggest that increases in overall defense or nondefense spending on goods and services have about the same effect on total employment. Simulations using the models of Data Resources Incorporated and Wharton Econometric Forecasting Associates bear this out. These same models predict somewhat smaller short-run employment gains from tax cuts or increases in federal transfers.

Recent economic analysis suggests that more government spending financed by higher government debt may not increase aggregate employment as much as shown by the models for three reasons. First, as economic activity begins to expand in the sectors stimulated by increased government spending, interest rates begin to rise if money growth is held constant. This can crowd out other forms of economic activity and employment. (In monetarist theory, the offset is almost complete within a very short time period.) Second, the same interest rate increase attracts foreign capital which, under flexible exchange rates, bids up the value of the dollar and decreases employment in export industries and in industries competing with imports. Third, the deficit has recently reached such alarming proportions that further increases could raise fears regarding the long-term health of the U.S. economy; this could inhibit business from making the long-term investments so necessary to continued economic growth. The negative impact on investment could, in other words, be greater than that which would be expected to result from normal "crowding out."

The economics profession is now in the midst of an intense debate as to whether standard models reflect these phenomena adequately. Whatever the outcome of this debate, it is unlikely to affect the comparison between the employment effects of defense and nondefense purchases. All the theories find that shifts between defense and nondefense purchases have only negligible employment effects.

More generally, it should be noted that many forms of defense spending have very similar counterparts in the nondefense budget. It would be surprising if the construction of aircraft runways had macro-economic effects very different from the construction of highways; or if an increase in military retired pay had effects very different from an increase in Social Security; or if increased Pentagon hiring had effects different from increased employment in nondefense departments of the government.

Private Production Will Slow, But Productivity Gains Need Not Slow Significantly

There is one major difference between the defense and nondefense budgets. Defense budgets are more heavily weighted toward purchases of goods and services, and relatively light on transfer payments.

Economists often refer to government purchases of goods and services as being "exhaustive," that is to say, as directly depriving the private sector of labor and material resources. This does not argue against such purchases

if the government can put the resources to public uses that are more efficient than their private uses. Transfer payments, on the other hand, are not exhaustive. They simply transfer the power to buy goods and services from one group to another. They may, as a side effect, create disincentives to work and save, thus indirectly reducing the supply of productive resources to the private sector; but the size of this effect is a matter of great controversy. There is no doubt, however, that increased purchases of goods and services caused by higher defense spending would decrease productive resources available to the private sector.

In the short run, higher defense spending could also slow commercial research and development (R&D), an important factor in productivity gains. In the longer run, effects of defense spending on productivity growth should be negligible.

Productivity gains in the private sector—defined as growth in output per worker—could be adversely affected if increases in defense purchases draw off or begin to exhaust R&D resources. Defense spending demands a disproportionate share of scientists and engineers working on R&D. In 1981, defense spending amounted to about 6 percent of GNP but used about 25 percent of all such scientists and engineers. Thus a sharp rise in defense spending could, in the short run, reduce the number of skilled R&D workers available in the nondefense sector and hence slow commercial R&D and productivity.

In the long run, a shift toward more defense spending would probably have negligible effects on productivity growth. As the wages of scientists and engineers rose, any shortage should be offset as colleges and universities provided more graduates. Moreover, defense production sometimes yields innovations benefiting private-sector productivity and possibly stimulating derivative innovations in the private sector. Examples of defense-supported developments benefiting private productivity include jet engines and computers.

CONCLUSION

Nothing in my testimony should obscure the fact that defense spending imposes a major cost on the economy. It clearly deprives the private sector and the nondefense public sector of resources that could be used for other productive purposes. It is up to the Congress to decide whether this cost is necessary in order to enhance our national security.

Moreover, this testimony did not examine whether the resources consumed by the defense effort are being used in the most efficient manner possible. That is to say, the analysis did not ask whether the same degree of national security could be purchased with fewer resources than are consumed by current spending levels or whether, with some change in the composition of spending, more national security could be purchased with the same total expenditure.

Our analysis does suggest that, if national security requires, the economy can support the defense buildup envisioned in the first budget resolution. Under that buildup, defense in 1986 would consume about 7 percent of GNP, a level well below the peacetime highs achieved since World War II. Moreover, the economy can sustain this buildup with little risk of rekindling inflation, at least in the next few years.

The analysis also strongly suggests that in making difficult decisions about defense spending, the Congress need not be concerned that a given increase in defense purchases will have a very different impact on employment, inflation, or other macroeconomic variables than an equal increase in nondefense purchases. Everything that we know suggests that, within the range of the options now being proposed, the effects are similar.

Whatever the level of defense spending, a key question for the economy is how to pay for the buildup. Ultimately, the Congress must pay for it by reducing resources devoted to other areas--taking them either from the private sector through increased taxes or from the public sector through further reductions in nondefense spending, or both. The longer the Congress continues to finance the buildup through growing federal deficits, the greater the risk of slowing long-run economic growth.

CAPACITY UTILIZATION IN DEFENSE-INTENSIVE INDUSTRIES: PAST AND PROJECTED (In percent)

	Average	Annual Peak Rates			Actual			Projected a/		
	1948-1980	1965-1966	1973-1974	1978-1979	1980	1981	1982	1983	1984	1985
Aerospace, etc.	73	92	76	91	89	81	71	68	74	83
Instruments	82	90	88	90	86	83	77	75	82	88
Electrical Equip.	83	97	87	89	84	84	77	81	84	85
Fabricated Metals	79	87	85	88	79	79	66	67	74	78
Nonferrous Metals	85	100	96	92	81	83	67	76	82	90
Iron & Steel	84	94	97	89	73	80	51	60	76	85
Total Manufacturing	83	91	88	86	80	79	71	75	80	83

a. Projections assume defense spending consistent with the First Budget Resolution and CBO's August forecast.

Mr. ASPIN. Thank you, Dr. Penner.

Before we start the issue of defense, let me just ask you about the budget and about the general shape of the economy as you see it right now.

The economy is growing and the recovery is quicker than most economists, I think, anticipated this summer. What is the relative figure? How much faster is it recovering, where are we going at an annual rate now?

Mr. PENNER. Economic growth in the first quarter was a little over 2 percent; in the second quarter, well over 9 percent; and in the third quarter close to 8 percent. I think the consensus guess for the fourth quarter is around 5 percent at an annual rate. As you suggested; our cumulative growth through the first three quarters of this recovery is just about the average for a postwar recovery.

Mr. ASPIN. "We," meaning many economists and most Government forecasts predicted a recovery somewhat slower than the normal recovery.

Mr. PENNER. That is right. On a year-over-year basis, the CBO forecast last February, as I remember it, was for real growth of a little over 2 percent. We moved that up to about 3.1 percent in our August forecast. It is probably going to be closer to 3.5 percent, something like that.

Mr. ASPIN. What basically occurred that we did not anticipate, or that people didn't anticipate? Why did the recovery, in fact, turn out to be a recovery very much like past recoveries, rather than the slower recovery that was forecast?

Mr. PENNER. I suppose everybody has his or her own theory of that. We will have to wait for the judgment of economic historians. Certainly monetary policy was very expansionary for quite a long period, from the summer of 1982 through the early part of 1983.

Fiscal policy was also expansionary. But it is my view—and I am not sure that this is the consensus view—that the tax actions of 1982 helped bolster confidence somewhat. When I was a private citizen, my own projections of the budget deficit were constantly exploding, and those tax actions stabilized it at a very unpleasant level.

We have been referring to this as a normal recovery so far, but there are certain respects in which it is very abnormal. One, of course, is the very high level of real interest rates. Another is the terrible trade deficit.

Now, in my view, both are very directly related to the budget deficit. The budget deficit is pushing up real interest rates. That is attracting capital from abroad. That creates a demand for our dollar when foreigners want to buy our securities. That, in turn, makes it very much harder for our exporters to compete abroad. It makes it easier for foreigners to compete in the United States against our auto, steel, and other industries.

The end result, it seems to me, is that the crowding out of business capital formation that all of us feared at the beginning of the year has not occurred to the extent that we thought it would. I would guess that it has not occurred largely because of this foreign capital inflow.

Now, that is not very reassuring. If we lived in a completely isolated world, and had no foreign capital to draw on, interest rates

would be much higher in this country. Presumably business capital formation would be less; our capacity to produce and our standards of living late in the century would be lower because of the budget deficit.

Drawing on foreign capital allows us to sustain a higher level of American investment, and, therefore, of American production out into the future. But our standards of living are lower anyway because we are, in essence, pledging more and more of that production to pay interest and dividends to people who do not live in this country.

So either way, if you believe with me that the budget deficit is the cause of all of these phenomena to a large degree, you do lose standard of living in the future, even though our production—our rate of investment—really looks quite good right now.

Mr. ASPIN. If the recovery is coming at a faster rate than anticipated, does that mean that ultimately the crunch when private investment and public investment—private demands and public demands competing for the available savings--will push interest rates up, does that move forward the date that the crunch is likely to occur?

Mr. PENNER. It is certainly possible that it does. We are now reviewing our forecast that we will be coming out with officially on the 1st of February. I think it is reasonable to believe that we will have higher interest rates in our forecast than we would have had if the Congress had followed through with the first budget resolution and had really reduced the future deficits.

However, it is not my thinking at the moment that we will see a very large rise in interest rates. We have now essentially experienced the big change in the Federal budget deficit, and it is now stabilizing at on atrociously high level. But it is the level that one has to look at. That is stable now. That seems to me to have something to do with the level of interest rates.

If you are looking for future changes in interest rates, you have to look at changes in the flow of savings and investment. The Federal budget's draw on the savings, as I say, is stabilized through 1986, with a do-nothing fiscal policy. State and local surpluses are growing nicely, although one would expect their spending to start to rise with some time lag. We are drawing nicely from abroad. As I said before, that helps us keep interest rates down, despite its other unfortunate implications. Corporate cash flow is really enormous.

So I don't personally at this moment see a great fear of a sudden crunch. It doesn't mean it won't happen. But that doesn't make me feel very good, because I don't see the interest rate situation getting worse than the horrible situation we have right now, which is really off the chart in terms of post-World War II history in this country.

Mr. ASPIN. But if the recovery is able to continue with this high interest rate, what is wrong with that?

Mr. PENNER. Well, it is ultimately an unbalanced recovery. The thing that is most unbalanced is the trade deficit. As I said, while the recovery is going on, we are pledging more of our production in the future to foreigners. We are developing an interest bill on the debt which is now the fastest growing component of the budget.

There is some danger that that could get completely out of hand. By that I mean that you could not at some point either raise taxes or cut other spending to cover even the growth in the interest bill.

At that point you really have a disaster on your hands in the sense that, if you cannot correct the situation, eventually you have to repudiate the debt. Through history, countries facing that problem have gone to higher inflation, which I am certainly not forecasting. I think we are a long, long way from that end. But that is the end of the road we are on right now. I really have not explained the effects of the trade deficit very much, but that is really hurting our heavy industry, steels, autos, et cetera. It is hurting agriculture very badly. If we had a lower exchange value for the dollar, American farm prices would be higher, American spending in the budget itself would be lower.

I think one can go on and on with the indirect effects that are not pleasing, to say the least.

Mr. ASPIN. Let me run it past you this way. When we were predicting a slow economic recovery, the guessing was that Congress—and the administration—would not do anything about the deficit, at least until after the 1984 election on the grounds, first of all, that doing something about the deficit is never easy but it is certainly tough in an election year, which is also a Presidential election year.

The thinking was that there is probably enough time, that we will get through the 1984 election without killing off the recovery, and we will get through 1985, maybe 1986, before this deficit poses a threat to the recovery.

So, therefore, if it is politically impossible to do something about the deficit in 1984—it would be nice but given the political situation, it may not happen—but it is still not a disaster.

Now with the recovery coming quicker, does that change that calculation?

I guess you are saying that it does not change that calculation, that you do not see an effect on interest rates such that it would kill off the recession coming any closer.

Mr. PENNER. I think in theory we can go on quite a long time with this terribly unbalanced fiscal policy. But we know with certainty that eventually the day of reckoning will come, if only because of the very rapid increase in the interest bill that is implied by all of this debt that we are putting out. And that increase in the interest bill is enormous.

For example, if we really have a do-nothing policy, and interest rates just stay right at the September 1983 level, the interest bill between 1982 and 1986 in our projections will have gone up by $56 billion. Now, we have had a lot of argument about a tax increase in fiscal 1986, of something over $45 billion. That doesn't even cover the increase in the interest bill.

So, no, it is not a disaster, but we know with certainty that we have got to fix this thing up sometime. Putting it off means that the problem gets harder and harder as you go on. To a simple-minded soul like myself, knowing with certainty that we ought to fix it up because the current course is not sustainable, of course, I wish we would do it sooner rather than later.

Mr. ASPIN. Let's talk about defense. First, about the effects on inflation.

Our forecasts and your data indicate that, in fact, there is probably not much danger of creating any bottlenecks by the increase in defense expenditures that is now currently forecast. Is that correct?

Mr. PENNER. That is correct.

Mr. ASPIN. Leaving aside the very important issue, the macroeconomic issue of how you pay for this, the impact of defense spending on inflation is really related to the question of bottlenecks. Is that correct?

Mr. PENNER. Well, leaving aside really the most important question of how you finance it, bottlenecks would——

Mr. ASPIN. Is there any other way in which defense spending can influence inflation besides raising the question of how you pay for it, that is, the macro question of taxes and cuts and deficits, which, of course, do have an effect on inflation?

The second way in which defense spending can affect inflation is through bottlenecks. Any other way?

Mr. PENNER. Perhaps I was too hasty to accept the word bottleneck. Obviously, if you substitute defense spending for some other kind of spending, to some degree you will be demanding different things.

I mentioned R&D. So you will effect a relative price change to some degree in the economy, even though you might not create a serious shortage or a bottleneck. In the way we measure inflation with our Consumer Price Index, relative price changes often show up as increases in the overall price level. So in that sense, there is some problem.

Mr. ASPIN. One of the things that has happened is that we have a higher inflation rate in the defense area than we have in the regular CPI. The Pentagon is very often interested in trying to use a different inflation rate for their figures than we use for the CPI.

Why do we have a higher inflation rate in defense? That seemed to be true even during the 1970's when we were spending less—there could not have been much pressure on those resources in the defense area—in fact, in real terms we were probably leveled out in defense spending.

Why is it that we have these higher inflation rates even in times when we don't seem to be spending enough to be putting an upward pressure on defense prices?

Mr. PENNER. I am not sure I can give you a very satisfactory answer there. I think it is very difficult to measure prices in the defense sector, if only because of very important quality changes that go on.

It is generally hard to measure prices in the public sector in general. Indeed, one way of doing it simply looks at increases in wages. So to the extent that you increase wages in real terms, it appears as though the Government sector in some sense is inflating more rapidly than other sectors.

Generally we assume that there is no productivity growth in Government, and I think that is clearly wrong. So part of it, I think, is a pure measurement problem. When you do have a big ex-

pansion, it can as well be a true relative price problem related to increases in demand.

Some of my associates here have looked at this particular issue more closely than I. I might ask, would either of you like to speak on this? Mr. Forest.

Mr. FOREST. I have looked at the problem. We only have data from 1972 to date on defense prices. I think one of the reasons that there may be a difference is the measurement problem that Dr. Penner just mentioned. Another significant factor is the mix of goods that the Department of Defense buys. I have tried to come up with a matching mix. This is kind of a metaphysical exercise, comparing fighters with corporate jets and large aircraft carriers with yachts and things like that.

But you can do some comparisons: Vehicles against trucks and tractors and things like that. When you make those comparisons, it turns out that there isn't a great differential between the defense inflation and inflation in somewhat comparable nondefense products.

Mr. ASPIN. There is or is not?

Mr. FOREST. There is not. Primarily it seems to be a mix problem.

Mr. ASPIN. So defense buys more—what is defense buying that is different from the economy in general?

Mr. FOREST. Defense has been unlucky. It has bought those particular items which for a variety of reasons have increased in relative price over the period 1972 to date.

Mr. ASPIN. Examples being what?

Mr. FOREST. Things that are dependent on steel, for example. The price of steel has gone up—because of the large energy component in the production of steel. A number of military goods are like that.

Mr. ASPIN. All right, thank you. Let me ask about the employment impact of defense spending. Basically your contention is that there is not much there, that a fixed amount of spending on defense will get you about as much as it would spend in other ways by the Government?

Mr. PENNER. Well, the same as other purchases—purchases of goods and services—probably somewhat more than transfers in your typical model, or a lot more than grants, for example.

Mr. ASPIN. And——

Mr. PENNER. Grants to State and local government typically have a low multiplier effect.

Mr. ASPIN. Let's say we took a kind of arbitrary chop-off of the defense budget, let's say an arbitrary $5 billion, a representative 5 percent of defense.

Mr. PENNER. Yes, that is a problem, as you know.

Mr. ASPIN. Let's suppose you are able to do it and put the money into a representative cross sample of nondefense spending--any Government spending but defense. Would that mix give you any or much difference in employment?

Mr. PENNER. Essentially negligible.

Mr. ASPIN. OK. What if you took a much more specific thing, and you cut something specific out of the defense budget, such as a weapons system, and you took that money and transferred it into

something more specific on the domestic spending side. Could you get an increase in employment if you did that?

I am trying to think of an example of a weapons system on the one hand compared to something that would be pretty labor intensive on the other.

Mr. PENNER. Sure—just as you have explained it. You could find some very capital intensive defense product. You could then shift that money to something labor intensive. For example, the old CETA title VI program was probably very labor intensive. In that scenario, the mix would obviously change.

Similarly, within the defense budget, if you took $10 billion from weapons procurement and put it right to the hiring of men, you could have an employment effect.

Mr. ASPIN. Suppose you broke down the defense budget. What would the procurement part of the defense budget be roughly comparable to in nondefense spending? You said that if you broke the budget into procurement, pay, other personnel costs, and then O&M costs, then pay would be essentially not much different from other kinds of programs that are mostly salaries?

Mr. PENNER. In general terms. If you look at the whole defense budget, apparently it is somewhat more intensive and skilled work.

Mr. ASPIN. And it would probably tilt a little toward higher paying jobs than would most comparable Government programs, certainly most Government public service employment programs.

Mr. PENNER. Sure.

Mr. ASPIN. But retirement payments, would not differ much from Federal civil service retirement or similar expenditures.

Mr. PENNER. Yes.

Mr. ASPIN. Let me ask about the final point, about the issue of economic growth and impact on economic growth.

Have you seen any studies that you have confidence in on the issue of the fallout from military R&D expenditures to the domestic economy?

Mr. PENNER. The spillover?

Mr. ASPIN. Spillover, yes.

Mr. PENNER. Let me ask Bob or Larry.

Mr. FOREST. I have looked at a couple of studies. I should mention that one of the most intractable areas of economic research is trying to trace the sources of productivity.

There is no definite conclusion yet, other than the obvious one that a dollar spent on military R&D would probably be less beneficial to civilian innovation and productivity than a dollar spent directly to get at that objective.

Mr. ASPIN. Nothing you have seen would show that it is being 50 percent efficient or 25 percent or any numerical number you can put your finger on?

Mr. FOREST. It has to do with the type of R&D. For the Government as a whole, a disproportionate share is basic research compared to the economy as a whole.

That is not true of defense, however, where there is much more applied research. So one would expect that the spillover would be less than R&D money put out by the National Science Foundation.

Mr. ASPIN. What was that again?

Mr. FOREST. The Federal Government as a whole funds rather large shares of basic research.

Mr. ASPIN. Pure research.

Mr. FOREST. Pure research. Where one would expect a large spillover, yes. The military budget is not like that. It is more oriented toward applied research and development.

Mr. ASPIN. So you would expect there would be more civilian use, spillover, of National Science Foundation money than, say, defense R&D money?

Mr. FOREST. Yes.

Mr. PENNER. It might be more spillover. It doesn't mean the rate of return is higher.

It is no easy trick to measure that rate of return in particular private industries or most certainly in the military.

So one way of putting it is that you might spend an R&D dollar in the military and make some weapons system very much more effective. And in that sense, that dollar would have a very high rate of return, but only a tiny portion may spill over. It may be that basic research dollars don't have a very high rate of return but it spreads around a lot.

Mr. ASPIN. So spillover is not the same as rate of return.

Mr. PENNER. Right. That is right.

Mr. ASPIN. If you compare military R&D with private R&D, say of a large corporation, is the mix between applied research and basic research in the military comparable to a large corporation? How does the comparison run?

Mr. FOREST. We can get those numbers, certainly; they do exist. I don't remember just what they are off the top of my head.

[The information referred to above follows:]

Share of R&D budget devoted to basic research

Source of funds	Share devoted to basic research
	(1972-80 average, in percent)
All Federal Government	17.7
Department of Defense only	16.7
Private industry	4.4

Source: National Science Foundation.

Mr. ASPIN. Is there anybody who does work in this area who comes to mind as being a resource—anyone who has done any valuable analysis of the issue, of the spillover effect from military R&D?

Mr. FOREST. I don't think I am familiar with any research focusing on the military alone.

There are a few studies trying to compare total federally funded research with research funded by the private sector, but they do not focus specifically on the military.

Mr. ASPIN. OK. Let me ask a question about the general issue of defense spending and investment.

Obviously we can have high levels of defense spending and high levels of spending on investment and other things. There is nothing

inherent in higher defense spending, that automatically leads to a reduction in investment. You can take it from consumption or, you can take it out of other Government programs.

Is there any evidence that shows that when we spend more on defense we spend less on investment in the civilian economy?

Mr. PENNER. Well, in a fully employed economy I would say, yes. The essence of the problem is that we take resources from the private economy and put them to the defense purpose.

Most important by far in determining the mix of resources that we get out of the private economy in terms of the consumption-savings mix, I would suggest, is overwhelmingly a question of how we finance that increase in defense spending. Should it be with consumption type taxes? Even consumption taxes might lower savings because of the income effects, but not as much presumably as a tax on returns to capital.

Printing money, as you know, would extract a different mix out of the private economy. So that is overwhelmingly the most important question, how we finance it.

You indicated that if we want we can get it out of investment or out of consumption and so on. I am not sure that we know the effects of these various ways of financing with such precision that we can really target things that precisely, but we can certainly bias the financing one way or the other.

Mr. ASPIN. If someone were to ask you why U.S. productivity is slowing or has slowed, would you ordinarily list increasing defense spending or the level of defense spending in this country as among those reasons?

Mr. PENNER. As you know, it is one of the mysteries in economics exactly why productivity has slowed. Since it especially slowed in the 1970's from 1968 through 1976, when defense spending was really on a long downturn I guess it would be one of the last things that would spring to mind.

On the other hand, it is certainly true, as I noted in my formal testimony, that defense is R&D intensive and that technological change is responsible for a very high portion of our economic growth. So to that extent, it may dampen productivity growth in the private sector a small degree.

Putting it more generally, obviously we would all be better off if the state of the world were such that we did not have to bear this enormous burden in the defense side, but we have to bear it. We have to bear some burden.

We can argue a lot about exactly what it should be. But really the bottom line is that we really have to judge that expenditure of resources on the basis of what we get from it in terms of our enhanced national security. Worrying a great deal about whether a defense dollar is more inflationary or more employment intensive or more R&D intensive than a food stamp dollar or some other dollar is far down the list of worries, in my view. The real question is what kind of national security are we getting for that dollar, and not what is its secondary inflation effect.

Mr. ASPIN. I agree. Assuming that we are planning our defenses adequately to meet our security needs, the only issue arises in comparisons between various countries. I guess the question would arise in the defense burden apportioned among our allies. Japan, of

course, has a very low defense expenditure, and we have a relatively high one. Assuming that together we are doing what we need to do to defend against the Soviet Union, the question is maybe one of reapportioning costs.

The question arises of the cost of defense spending on inflation, employment, but mainly on economic growth. To what extent does the difference in the percentage of the gross national product going to defense in the two countries, help explain the fact that economic growth in Japan has been at a greater rate than economic growth in the United States?

Mr. PENNER. In terms of the growth rates per se, It would have to be a guess, obviously—that it would play a very small role in explaining those two different growth rates.

But obviously, if we could wave a magic wand and the world became a friendlier place and we could diminish our defense budget, we could experience a one-time big increase in consumption or private investment or whatever we wanted to devote it to.

So there would be that one-time increase in these other goods. But in terms of comparing the long-term growth rates of the two countries, I think you would have to reach pretty far to use that.

Mr. ASPIN. Suppose we could even out the burden between the United States and Japan, for example. And suppose we were both spending about 6 something instead of what is now less than 1 percent for Japan.

Mr. PENNER. Over 6 percent of GNP.

Mr. ASPIN. So say roughly 6 to 1, a difference of about 5 percentage points of GNP, which is a lot of bucks.

Mr. PENNER. Right.

Mr. ASPIN. Plus a lot of scientists and engineers and other resources that that 5 percent of GNP represents. If that money is not going to defense and goes to something else, there is nothing automatic that says it goes to R&D and investment but certainly a pretty good chunk of it, even if you left it alone, would fall into that area.

Mr. PENNER. Yes.

Mr. ASPIN. Why wouldn't that have an impact on the longrun economic growth rates?

Mr. PENNER. It has some impact. Let's suppose we could take 5 percentage points of the GNP out of defense now. That is important, obviously. It is equivalent to the whole addition to real GNP next year in our forecasts, roughly speaking.

So, yes, it is important. If we could take that amount and add it to investment, if we could somehow control it, that would be very important quantitatively to the investment that year. But the investment that year is only an addition to this great, huge capital stock out there anyway that we have.

So it would be of some importance but it would be a one-shot kind of thing, and it would have secondary effects on the productivity of the private sector. Those would extend through time but when it came to totaling up the difference in the growth rates over the whole period from 1983 through the year 2000 or something, it would be pretty small, is all I am saying. Not that it would be zero.

Mr. ASPIN. What do you assume about defense in the next year? Assume it goes back to 6 percent or stays at 1 percent—say we

were willing to cut it to 1 percent, whatever Japan is spending now, and leave it there.

Mr. PENNER. I suppose if we could add it all to investment year after year that would be a sizable difference. I guess we would in fact consume a great deal of it. Again, the effect would not be enormous in the growth rate. It would not be unimportant, however, because a few tenths on the growth rate accumulated over time is significant.

The bottom line is that in some sense we are worse off than the Japanese. We talk about the spillovers from defense R&D to the private sector. Well, really an important spillover is the fact that the Japanese get an enormous benefit from our own defense effort. That is a real spillover of major magnitude. To a large degree, they get that free of charge.

Obviously, if we could figure out some way of having the countries that benefit from that—and I shouldn't single out the Japanese—pay for it somehow or another, we would be better off. There is no doubt about that.

Mr. ASPIN. Questions?

Mr. CLARK. Just one question on the sensitivity of the conclusion, the assessment, that inflation isn't going to be a problem in the defense area. That is based on the assumptions in the first budget resolution we adopted and presumably it is reinforced by the fact that actual appropriations were even lower at least for 1984.

Mr. PENNER. Yes.

Mr. CLARK. Lower than we assumed in the budget resolution. What if we go back to the administration's defense package as the papers tell us the administration wants to do?

Mr. PENNER. We don't know what the administration is going to ask for precisely and, as I said, we have not completed our own economic forecast for next year. So what I say has to be tentative.

But I think the conclusion reached in my formal testimony would hold in all probability. If you put all these things together, you get quite an increase in the price of what the Pentagon buys in a select number of industries. That would be important to the cost of the weaponry, but would not in our judgment be a great enough quantitative significance to have a major effect on the overall price levels in the economy.

Mr. CLARK. Thank you.

Mr. ASPIN. Let me ask you this: What reasons would you give if somebody were to ask you why is it that the rate of growth and productivity in Japan is higher than in the United States? What would you give, what reasons would you give?

Mr. PENNER. Well, that is——

Mr. ASPIN. If you are skeptical about defense, what reasons do you have?

Mr. PENNER. Again, it is one of the great mysteries. But one of the more important points to make is that they were growing from a very low level. It was in that sense easier for them.

Standards of living in Japan are still not as high as they are in this country if you properly adjust exchange rates. They were able to use technology that we had developed. They do have a much, much higher savings rate.

Admittedly, as odd as it seems, most studies of productivity determination don't show capital formation being of overwhelming importance. Frankly, I am somewhat skeptical of that particular finding because, in my view, capital formation plays an important role in the implementation of new technology. But that is just a guess of mine, and people like Edward Denison in this country, who is really the foremost expert on measuring the reasons for economic growth, reject that hypothesis.

But technology and human capital do seem to play a very large role, and they were able to borrow a lot from us in that regard. As I say, the enormous savings rate and capital formation rate are also factors.

Mr. ASPIN. What is the rate of investment in the Japanese economy compared to the United States?

Mr. PENNER. I don't have that number. We can get a number or a set of numbers for you Mr. Chairman.

It is difficult to make an easy comparison, however, because of the way that savings and investment are measured. Different countries use somewhat different definitions and have different institutional arrangements. But we can give you the numbers as they are computed.

[The information referred to above follows:]

GROSS SAVINGS AS A PERCENT OF GDP

Year	United States	Japan	EEC[1]
1960	19.6	33.4	24.1
1970	18.1	40.2	24.8
1980	18.3	31.5	21.4

[1] European Economic Community

Source: Organization for Economic Cooperation and Development

Mr. OOMS. Some testimony given to the committee last year argued that defense spending had significant feedback offsets to the budget deficit, and that one ought to look at the budgetary impact of defense spending in that light; and that furthermore, these feedback effects on the budget from defense spending were larger than those that you would find from other types of spending. Would you care to comment on that?

Mr. PENNER. Let me comment on the first part first. Again, the vitally important question is how it is financed, as you know.

If in your typical macroeconomic model you just increase spending and allow part of that to be financed by new money creation, it is really quite stimulative in that sense and in the typical model you get quite a substantial feedback. But a large part of that is really from the money creation, and not so much from the increase in the velocity of money caused by the increased purchase.

I think the way to run it through the model is to hold monetary policy constant. By that I mean hold the rate of growth of some target, say narrowly defined money supply, constant. In that case in all models you get less of a multiplier, less of a stimulus effect, and most of these models still give you some increase in GNP.

As you well know, the different models show very different multipliers, too, and there is a great controversy within the profession as to whether these models are appropriate at all in the day in which we live.

But if you do believe them, then, yes, there is some feedback. Not very much, if you hold the money supplier constant, however.

As to the question of whether there is more feedback from $10 billion spent on defense purchases or nondefense purchases, the examples we have run suggest very little difference. Of course, if you compare defense spending to some other form of spending—such as transfers—these same kind of models are structured in a way that typically makes transfer spending less stimulative. And as I said before, spending on grants to State and local governments—where you just sort of swap one deficit for another, as it were—results in very little stimulus in these models.

But even if you could make a good case that a dollar of defense spending employed more people, I do not think that that would be a case for biasing your whole budget toward defense. Ultimately, still you have to ask how much it is worth.

If we are so clever at being able to change employment, then there are all sorts of other means of getting to a given employment target other than that particular way. I don't think it is easy to get to these targets, needless to say.

But I return to the basic point of my testimony: Regardless of your economic theory or the model you use, if you are talking about an increase in a particular kind of government expenditure, the first and the most important question by far is, is it worth it? That is, is it really providing society with a greater good than that same resource or spending could provide in some other area of the economy?

So references to employment effects, inflation effects, et cetera, are really red herrings. You can't escape judging the worth of the defense dollar by how it impacts on our national security. It is a very difficult thing to do.

Mr. ASPIN. Dr. Penner, thank you very much.

Mr. PENNER. You are welcome.

Mr. ASPIN. We are adjourned.

[Whereupon, at 5:11 p.m., the task force adjourned until 9:30 a.m., Friday, December 9, 1983.]

DEFENSE AND THE ECONOMY: THE ISSUES OF JOBS, INFLATION, AND LONGRUN GROWTH

FRIDAY, DECEMBER 9, 1983

HOUSE OF REPRESENTATIVES,
TASK FORCE ON ECONOMIC POLICY AND GROWTH,
COMMITTEE ON BUDGET,
Washington, D.C.

The task force met, pursuant to notice, at 9:33 a.m. in room 210, Cannon House Office Building, Hon. Les Aspin (chairman of the task force) presiding.

Mr. ASPIN. Let's begin the hearings this morning on the impact of defense spending on the economy.

I would like to welcome our first witness this morning, David Chu, who is Director of Program Analysis and Evaluation in the Office of the Secretary of Defense.

Mr. Chu, welcome to our hearings this morning. I don't know you but I must say, sir, that everybody whose opinion I trust in this business thinks very highly of you.

Mr. CHU. Thank you, that is very gracious.

Mr. ASPIN. There are many who serve in the Democratic and Republican areas who think you are pretty good.

Mr. CHU. Thank you.

STATEMENT OF DAVID S. C. CHU, DIRECTOR, PROGRAM ANALYSIS AND EVALUATION, DEPARTMENT OF DEFENSE

Mr. CHU. It is a pleasure to represent the Department at the task force's hearings on the relationship between defense spending and the Nation's economy.

I would like to respond to the particular questions you posed in your letter of invitation in terms of what I would argue are the three major questions that have characterized this debate over the last several years:

First, can we produce the goods needed for this buildup?

Second, what effect on macroeconomic indicators is defense spending likely to have, and what is the proper relationship of defense spending to stabilization policy?

And finally, what proportion of its resources can the Nation afford to devote to national security?

In terms of the first issue—the capacity question—I would like to cite as one of the main bases for our conclusions an August 1982 study on this subject by the Department of Commerce. The study presented estimates of defense and nondefense demands in 1985 for the products of approximately 500 industrial sectors. One of its

most interesting findings was that in only 10 percent of the sectors did defense demands account for more than 5 percent of projected domestic production.

I think that is an important conclusion because it illustrates that defense spending is a relatively modest factor in our total economic picture. For each of the 50-odd defense sectors, the Commerce Department then estimated "available capacity," which is defined as the sum of unused capacity at the study's starting point, 1979, and the additional capacity estimated to be acquired between 1979 and 1985.

Available capacity was compared with the total projected increase in defense and nondefense demands over the study period. Let me quote from what I view as the most important conclusion in most of the 58 defense industries, existing capacity—and those words are underscored in the original—is sufficient to supply the projected 1985 demands of the economy.

The Commerce Department went on to state, that the study revealed no instances in which industrywide supply bottlenecks are likely to prevent the achievement of national defense goals.

Similar conclusions were reached in a study by the Congressional Budget Office as well as in work by Data Resources, Inc., whose representatives you will hear from shortly.

The results of those studies have not made us complacent about industrial capacity. For several years now we have made a major effort to provide to industry our forecast of defense demands, assuming the President's 5-year plan is enacted. These projections are made for 400 industrial sectors—the number of sectors for which we have detailed data. In the last year we have supplied more than 2,000 copies of our projections to industrial groups, trade associations, and State and local planning agencies. We hope these projections provide a better basis for their own planning, especially for investment decisions. I might add that, on our part, there is an interest in encouraging additional firms to think about defense business, to expand the degree of competition.

I should add as a footnote that, as a byproduct, this work has produced some conclusions that run against the popular wisdom regarding the geographic distribution of defense spending. There is a widespread belief that increases in defense spending disproportionately benefit States in the West and South. Using these same models and extensions of our forecasting models, we have found that, in fact, the converse is true. Because of the emphasis on procurement in the defense budget plans for the next several years, it is the States in the Northeast and Midwest that will see their share of defense spending increase. In fact—and I think people do not generally appreciate this—New England, is now in the upper range in terms of its ranking for defense spending per capita. The States in these regions will, at least on average, see increases in their potential shares of defense activity if our planned budgets come to fruition.

Let me turn from the microeconomic effects, if you will, to the macroeconomic effects of defense spending, and, in particular, to two issues that have been of concern, inflation and jobs.

Our conclusions on inflation reflect both the adequacy of capacity in individual sectors and the results obtained from macroeco-

nomic forecasting models. Looking at this evidence, we don't see any danger that the defense buildup is going to rekindle, or somehow add in a significant way to, inflation.

The jobs issue has, I think, bedeviled the debate on defense spending. Our conclusion is similar to that offered yesterday by Dr. Penner, that is, there is no difference on average in the number of jobs created by defense and nondefense Federal purchases.

Now, it is true that the absolute number of jobs estimated by different models varies. But that fact reflects the structure of the models and the assumptions that people put into them. When you make apples-to-apples comparisons using any of these models you find that defense and nondefense purchases have about the same employment effects.

I should stress what the Secretary has said repeatedly; that is, we do not view the defense program as a jobs program. Defense spending should be undertaken for reasons of national security and foreign policy, and in response to threats we face—not to create jobs. But it is reassuring that there is no adverse economic effect in this regard.

I would like to step back, if I might, from the debate over macroeconomic indicators and ask what seems to me the important policy question: Whether or not we should try to vary defense spending, particularly in the short run, in order to adjust to changing economic circumstances. In other words, should we use defense spending as a tool of stabilization policy?

We would argue we should not. We say this largely because the reason for defense spending is to meet our commitments and objectives and to deal with the threats we face. But we would also argue that defense spending is a relatively inefficient tool of stabilization policy.

If you cut back procurement accounts in order to achieve economic results, you are dealing, as you know well, with funding that spends out very slowly. In the first year, the effects would be modest. On average, only between 10 and 15 cents of each appropriated procurement dollar is disbursed in the first year.

Moreover, if you are not prepared to terminate programs in order to cut back the procurement accounts, you must stretch out the programs; that is, buy the same number of items but at a slower rate. In doing so, you are invariably committing yourself to a less efficient production rate and so to higher defense costs in the long run.

Unfortunately, because of the relative insensitivity of outlays to changes in procurement spending in the short run, people tend to turn to the operating accounts when looking for savings. We would argue that is very bad policy. That means you cut the readiness of our forces in order to get some quick savings in outlays.

If I might, I would like to turn now to the last of the three questions posed, that is, whether or not this budget is affordable.

We would argue that it is. Now, I know there are those who contend that, somehow, defense goods are unproductive. I think that is a narrow view. It fails to take into account why defense spending is undertaken in the first place.

Defense spending is undertaken to insure the Nation's security. That is an important service. It is like spending on police services

or insurance. It is spending to deter an outcome, to insure the freedom and security we enjoy. Obviously, there will be debates about the proper level of defense spending, but I would argue it is one of the most important public services we have.

If we look at the defense budget as a share of GNP, I think we would come to the conclusion that the defense program is affordable. In fiscal year 1983, defense outlays will be 6.3 percent of GNP and about a quarter of all Federal outlays. That is a low figure by the standards of the 1950's and 1960's. In the decade between 1954 and 1965, defense spending averaged just under 9 percent of GNP—higher than it will be even toward the end of the proposed buildup, when we forecast it will reach 7.5 percent of GNP. That is well below the level in 1955, when defense spending was just over 10 percent of GNP.

In short, we would argue these are not only prudent defense improvements that we need but prudent defense improvements that we can afford. With that, I would conclude and respond to any questions you might have.

[Testimony resumes on p. 150.]

[The prepared statement of Mr. Chu follows:]

PREPARED STATEMENT OF DAVID S. C. CHU

It is a pleasure to be with you today to discuss the economic effects of defense spending.

This topic has been actively debated over the last few years. The debate has focused on three distinct questions:

- First, is existing and planned industrial capacity adequate to produce the goods required by our expanded defense effort?
- Second, what is the proper relationship of defense spending to stabilization policy?
- And, third, is the proposed defense program affordable in terms of our nation's resources, and prudent in the light of the threats we face, our commitments, and our nation's objectives?

My statement will review the position of the Department of Defense on each of these issues.

IS INDUSTRIAL CAPACITY SUFFICIENT TO PRODUCE THE DEFENSE PROGRAM?

In World War II and, to a lesser extent, the Korean and Vietnam wars, efforts to expand defense production ran into capacity constraints that caused bottlenecks. The spectre of a recurrence of widespread bottlenecks has

occasionally been raised in the course of the debate over the current defense budget. All of the evidence, however, suggests that significant bottlenecks are very unlikely for the foreseeable future.

The most extensive work we have seen on this subject is a study prepared by the Bureau of Industrial Economics (BIE) at the Department of Commerce. That study examined the adequacy of industrial capacity to accommodate both the defense buildup and vigorous growth in the economy. For each of 496 industries, BIE estimated total defense purchases in 1985. The estimates included both direct purchases by DoD and indirect purchases generated by the production of goods and services bought by DoD. BIE also estimated nondefense demands in 1985 for the products of these industries. Defense purchases--direct plus indirect--accounted for at least 5 percent of projected domestic production in 1985 for 52 of the 496 industries considered. These were classified as "defense" industries. (BIE also included in this category six other industries for which the defense share was less than 5 percent but which were judged to be important qualitatively to defense production.)

BIE then estimated the 1985 capacity for each of the 58 "defense" industries. The study did not evaluate capacity for the 448 "nondefense" industries because the share of those industries' outputs used directly or indirectly in defense production is small. For none of the "nondefense" industries did the defense share of output exceed 5 percent, and for most, it was considerably less than 5 percent. This points to a simple, but very important, fact that is often overlooked in discussions of potential bottlenecks. In the vast majority of U.S. industries, defense purchases--

because they are such a small part of total production--have little bearing on capacity. This is true even of the many cases in which defense purchases are growing rapidly.

For most of the 58 "defense" industries, BIE estimated the percentage of capacity that was not used in 1979, and conservatively estimated capacity growth between 1979 and 1985. "Available capacity," defined as the sum of these two figures, was used to measure how large an increase in demand over the period 1979-1985 could be accommodated without pressing normal capacity constraints. BIE compared that measure with the projected growth in defense and nondefense demands over the same period. BIE found that available capacity was sufficient to prevent bottlenecks, and furthermore, that for "...most of the fifty-eight defense industries, existing capacity is sufficient to supply the projected (1985) demands of the economy" (emphasis in the original). BIE's report went on to state that "... this study reveals no instances where industry-wide supply bottlenecks are likely to prevent the achievement of our national defense goals."

My office has looked in even greater detail at several of the defense industries covered in the BIE study. We reviewed capacity in some important metals and metal-working industries; went down through several tiers of the production process in the aircraft industry; and made plant-by-plant and product-by-product comparisons of purchases and capacity for several defense industries. The data we examined confirm the broad BIE conclusion, and indicate that ample capacity to produce the defense program is available.

Similar conclusions were reached in studies done by the Congressional Budget Office and Data Resources, Inc. Although concerns over bottlenecks are still sometimes expressed, all of the available evidence supports the conclusion that economically significant bottlenecks should not be a serious concern over the next two or three years.

I do not mean to suggest that we in DoD are complacent about industrial capacity. To the contrary, we continue to monitor the adequacy of industrial capacity and have taken steps to improve the industrial base. For example, we have made an active effort to provide information on future defense purchases to existing and potential defense suppliers. During the past year, we supplied about 2,200 copies of these projections to firms, trade associations, and state and local planning agencies. We recently developed the capability to make state-by-state projections of defense demands for the products of various industrial sectors. These projections are made available to groups involved in state and local economic development to assist them in their work. By providing information on future defense demands, we give the business community a better basis for formulating its investment plans. We also hope to attract additional suppliers to defense production, which will help to strengthen the industrial base and increase competition for defense contracts.

A by-product of our work on projecting defense activity at the state level is a sharper understanding of the geographic distribution of defense demands. It is often assumed that defense spending goes disproportionally to states in the West and the South. We have found that, as the composition

of defense spending shifts toward procurement, most of the states in the Northeast and the Midwest are likely to have increasing shares of defense spending. This finding is contrary to the "conventional wisdom" on the issue.

WHAT IS THE PROPER RELATION OF DEFENSE SPENDING TO STABILIZATION POLICY?

Let me turn now to some specific economic effects of defense spending.

During the past few years, there has been extensive discussion of the effects of defense spending on the inflation rate, employment, recovery from the recession, the federal deficit, interest rates, investment (particularly business fixed investment), productivity, and the trade balance. Since DoD has participated in some of these discussions, it is appropriate for me to review what we have said.

Inflation

One concern that is sometimes raised is that increases in defense production will lead to inflation by causing major bottlenecks in basic industries. The linkage between excess demand in individual industries and overall inflation rates is by no means simple and direct. As I noted earlier, however, the evidence indicates that the defense buildup will not cause major bottlenecks.

Jobs

A second concern is the job-creating potential of defense spending. DoD has used models developed by Data Resources Inc. to estimate the employment effect of increasing non-pay defense outlays. We found that each additional $1 billion (1982) in outlays creates 35,000 civilian jobs. This is toward the lower end of the range of estimates that we have seen of the employment effect of additional defense spending.

Nevertheless, some argue that other forms of government spending create more jobs than do DoD outlays. We have made several points in response. First, as Secretary Weinberger has said repeatedly, defense spending is not a jobs program. Second, our estimate refers to the entire non-pay portion of the DoD budget. The critics misleadingly compare average employment effects across a wide range of defense programs with much narrower civilian programs. Third, the multiplier for nondefense federal purchases of goods and services as a whole is about the same as that for DoD purchases of goods and services.

Perhaps the question is better put: Does a shift in the composition of federal outlays toward defense reduce employment? The evidence suggests that the answer to this question is "no."

Other Macroeconomic Effects

Three years ago, my office invited several leading economic forecasters to submit their projections of the macroeconomic effects of increased defense

spending. While the projections differed somewhat in their details, there was substantial agreement that even large increases in defense spending would not dominate the economic situation in the mid-1980s. The evidence we have seen suggests that this conclusion is still correct.

Taking a Broader View

I can appreciate the Task Force's interest in various specific effects of defense spending. But I would also urge that we stand back and look at these topics from a broad perspective. That seems to us particularly necessary because, as the discussions of various effects of defense spending have proceeded and taken on a life of their own, it is easy to lose sight of what seems to be motivating the interest in these effects.

Virtually all of those involved agree that defense spending should be undertaken only for purposes of national security, and not for economic purposes. Yet statements about the economic effects of defense spending often are made in the context of federal responses to relatively short-run changes in economic circumstances. It is, then, reasonable to ask explicitly: Should defense spending be deliberately varied in response to fluctuations in economic conditions?

Under present law, over three-quarters of total federal spending is defined as relatively uncontrollable. Programs in this category include social security, unemployment assistance, and medical care. The remaining one-quarter of the federal budget is described as relatively controllable primarily because it is subject to annual appropriations. The defense budget

accounts for nearly three-fourths of that amount. Defense programs are, consequently, often reviewed as a convenient area in which to cut spending.

DoD strongly believes, however, that defense spending should not be adjusted in response to short-run economic developments. Defense budgets are planned in terms of the commitments we have made and the threats we face, and those commitments and threats do not ebb and flow with the business cycle. Defense spending, therefore, should not be cut in response to transitory economic concerns. Doing so is relatively ineffective on its own terms; it generally increases defense costs; and it runs the risk of impairing our defenses, even if the cuts are temporary.

The effectiveness of using defense spending as a tool of fiscal policy is limited by the fact that expenditures for major weapons systems are typically spread over many years. Consequently, large cuts in procurement funding produce only relatively small reductions in first-year outlays. And cuts in defense spending do not translate one-for-one into reductions in the federal deficit. In fact, only about 50 cents of each dollar cut from the defense budget shows up as a reduction in the deficit. The effect on the deficit is so small because of the contribution of defense spending to GNP and employment. Because of that linkage, favorable effects on the deficit of cuts in defense spending would in large part be offset by the reduced tax revenues.

Using cuts in major defense programs as an instrument of short-run economic policy also tends to increase future defense costs. Decisions on what type of systems to produce, and on the number of each to acquire, reflect assessments of the threats we face. When pressures are brought on the defense

budget in response to short-run economic events, we are usually forced to postpone the start of new programs or stretch out existing ones. In either case, reductions in outlays come at the expense of increased spending in future years. Moreover, when programs are stretched, total defense costs are increased. Fewer units are purchased each year, thereby raising unit costs and, ultimately, total spending levels.

Given the importance of major procurement programs, their long planning horizons, and their relatively small budgetary effects, it is easy to understand--though not accept -why attention often turns, as it did during the 1970s, to reductions in those accounts that sustain the operations of our forces, especially the operations and maintenance (O&M) account. It was not good policy then, and is not good policy today, to look for quick savings by reducing operating expenditures. These are the readiness accounts, the accounts that keep our forces running. Cuts in them imply equipment grounded because of spare parts shortages, or fighter pilots whose proficiency has suffered because their peacetime flying hours have been cut back.

IS THE PROPOSED DEFENSE BUDGET AFFORDABLE AND PRUDENT?

The third major question being debated is whether the defense budget is affordable in terms of our nation's resources, and prudent in the light of the threats we face, our commitments, and our nation's objectives. I fear that this basic issue is often obscured by controversy over the detailed economic effects that stem from defense spending--or virtually any large government program.

There are those who argue that defense spending is fundamentally unproductive, in that the goods and services it buys are of no direct use to the civilian economy. This is an extremely narrow viewpoint, which fails to recognize the purpose of defense programs. The defense budget is analogous to premiums paid on an insurance policy or outlays for preventive medicine. We spend the money on very tangible goods and services to provide an intangible, but fundamentally important, service: national security.

Defense spending is, then, a matter of making prudent provision now for future contingencies. This is an allocation problem. Its proper solution requires careful judgments on the level and structure of our forces, informed by a long-run perspective on our nation's resources, our objectives, our commitments, and the threats we face.

We often describe the resource burden of the defense budget in terms of its share of GNP. We are aware that some dismiss this measure as simplistic. It is simple--but not simplistic. In the context of the broad allocation issue presented by defense demands, it is very much to the point to look to the share of GNP devoted to defense.

I do not mean to suggest that there is some fixed share of GNP that should be devoted to defense. To the contrary, determining the proper level of defense spending requires weighing our resources against our objectives, our commitments, and the threats we face. My point is only that it is relevant to the resource allocation debate to think in terms of the share of GNP devoted to defense.

Measured against GNP, the current defense buildup is neither particularly large nor rapid, and it is clearly affordable. In fiscal year 1983, DoD outlays amounted to about 6.3 percent of GNP and 25.9 percent of federal outlays. These figures are fairly low by the standards of the 1950s and early 1960s. In 1955--a boom year for the economy--defense outlays amounted to 10.5 percent of GNP, and between 1954 and 1964, they averaged 8.9 percent of GNP--more than will be the case during any year of the proposed buildup.

CONCLUSION

The three issues that I have addressed concern very different aspects of federal policy.

The question of the adequacy of industrial capacity has to do primarily with defense planning. It is an important issue, but has only fairly remote connections to broader questions of economic policy, because of the relatively modest level of defense demands in our total economy. Moreover, it is a problem over which we have some control. By making available information on likely defense demands, we can help avoid any capacity problems that might otherwise develop.

The other two issues I identified are often not separated, but should be. The threats we face, our commitments abroad, and our foreign policy objectives remain our paramount concerns in deciding on the level and structure of our military forces. The familiar figures on the defense share of GNP that I cited reflect our recognition that the limits on our nation's productive resources are also relevant to these decisions.

We believe that the present defense buildup is prudent when measured against <u>all</u> these standards. But recognizing the relevance of long-term resource constraints to defense planning is very different from agreeing that defense programs should be adjusted in response to short-term changes in economic conditions. That would be poor economic policy, as well as detrimental to our nation's security.

Mr. ASPIN. Thank you very much, Mr. Chu, for your testimony. You say that the BIE study was done in August?

Mr. CHU. The study was published in August 1982. It was started in April 1980.

Mr. ASPIN. Do you know what rate of economic growth they were anticipating at the time in the economy?

Mr. CHU. As I recall, the forecast they were using was a bit more optimistic. The study looked only at 1985 and 1979; it did not consider the intervening years.

Mr. ASPIN. What happened is that lately the recovery has been faster than had been forecast. I wondered whether that might change the results of the study?

Mr. CHU. So far, we would not so conclude. The study assumed that GNP in 1985 would be $1,691 billion in 1972 dollars. The administration's forecast, made last July, of 1985 GNP—also in 1972 dollars—was $1,668 billion, and the most recent DRI forecast puts 1985 GNP at $1,671 billion—in 1972 dollars.

Moreover, at the peak of the last business cycle, manufacturing capacity utilization rates were in the mideighties. We are now in the low seventies, 73 percent or something like that.

So we are still some distance from the kind of binding constraint that people worry about in that regard. Though leadtimes have increased a bit in the last year or so, they are still well below the maximum reached at the peak of the last business cycle. The aerospace industry, in particular, which was an area of concern in the late 1970's, is below the economywide average in terms of capacity utilization.

So, despite the strong recovery in the last few months, we don't see a big problem about to hit us on the head.

Mr. ASPIN. Let me ask you about the issue of bottlenecks and the effects of the defense spending on the inflation rate.

Some people—not necessarily in connection with these hearings—worry about the defense industrial base in the country. They claim that the industrial base in our economy for defense spending is not in good shape, particularly at the subcontractor level, I guess, and particularly in certain industries. I wonder how that relates to what you are saying about the absence of bottlenecks? You are right, CBO said the same thing yesterday.

One of the people who worries about this is Jack Gansler, who testified recently about the cost of weapons systems. Let me just summarize from his testimony. He says a major trend that has been observed, particularly in the post-Vietnam decade, is a growing lack of inefficiency and responsiveness in the defense industrial base. A series of reports at the end of 1980 all indicated significant problems in the defense industrial base.

There is a footnote for which he has No. 8, but there is no text, so I don't know what he is citing.

But he says that typical of these reports was one from the House Armed Services Committee entitled, "The Ailing Defense Industrial Base." It showed that there were sectors in which considerable excess capacity and, therefore, economic inefficiencies existed. In addition, they identified sectors where there was far too little competition and again inefficiencies. They also showed that there were significant bottlenecks, particularly at the lower tiers—subcontrac-

tors and parts suppliers—and that these resulted in a lack of production surge capability.

For example, it would take over 3 years for an existing aircraft production line to increase its output significantly. Later he goes on to talk about this, in the testimony, stressing what needs to be done to revitalize the industrial base. He says, for example, that in aircraft manufacturing there are many producers—probably too many given the number of aircraft needed—but for tracked vehicles there is only one supplier of tanks and one supplier of armored personnel carriers. That means inefficiencies and costs go up.

He talked about a situation at the subcontractor level for tanks where you had to get turrets, so you needed castings. There was only one producer, and suddenly you had the problems. If these reports are right, how can it also be true what you and the CBO are saying, that there are no bottlenecks?

Mr. CHU. I think there are several phenomena behind the observations he offered. We are concerned about this, too, and have tried to track defense demands down through the so-called second- and third-tier industries, some of which are not broken out in the aggregate input and output tables we and CBO use.

Mr. ASPIN. First of all, are you into the second tier? That is where Mr. Gansler thinks this occurs.

Mr. CHU. We are, in an aggregate way. Some detail has been added to our models as a result of our dialog with industrial and trade groups and individual companies that use our projections. We are limited, however, by what the basic data bases can show us. The input/output table we use includes 400 sectors. That is about as far as we can go.

Over the past several years, we have sought comments on our projections from industrial groups. One comment has been, in effect, don't just tell us that you will buy more aluminum or steel, for example—the input/output table stops at that level of detail—tell us specifically what vehicles or things the steel or aluminum will go into. That request is made because steel or aluminum is not a precise enough description of the product from the industry's perspective to understand the characteristics the material must have and what we are talking about. We have responded to that request.

One of the things that lies behind Jack Gansler's observations is that the real value of procurement declined dramatically during the 1970's particularly relative to the size of the Nation's economy. So the Defense Department went from being perhaps an important customer to being a relatively small one.

When you are a relatively small customer in any business, you get less attention from the people who are supplying the product. And, of course, market forces do work, and there are fewer people who decide to take up that particular business. Plus, of course, toward the end of the decade—particularly in aerospace which is an industry people know better and can follow better because there is more detailed reporting in trade publications and other sources—we had significant production problems in the defense as well as the civil sector. In addition, a major aircraft manufacturer was forecasting significant future production and was busy taking out inventory positions on a whole series of industrial products.

Of course, that sent the indicators, from people who watch leadtimes, soaring. As it turned out, all the projected demand did not materialize, and the manufacturer in question was somewhat disappointed.

The other thing we have to keep in mind is changes in real interest rates, which affect defense and nondefense buyers of goods. As real interest rates increase, firms respond in a rational manner, reducing planned inventories. Particularly in a time of uncertain economic circumstances, they want to avoid the risks associated with large inventories since carrying costs are so high.

That fact adds to the leadtimes you confront and, I think, exacerbates the problem. You go out and ask someone if they can produce "X" and they say, "Yes, but I don't keep the parts. I have to ask someone else to produce them." That feeds perceptions that leadtimes are a problem.

Finally, we have to ask ourselves whether our memory of how responsive the industrial base was 10 or 15 years ago is germane to what really would happen in a major mobilization. This question is partly what Jack Gansler is speaking to. Looking back to our experience during World War II, it took us about 2 years to reach the large wartime levels of defense production.

Finally, there is one other point I would make—and here I don't have a set of empirical information but only impressions. Because of changes in technology, many defense demands are different from demands in the civil economy. So we actually have plants whose sole purpose is producing defense goods.

At the prime contractor level, there is a great deal of excess capacity in many industries, aircraft assembly being an example. We are not planning to produce aircraft at anywhere near the rates typical even during the peak of the Vietnam conflict.

Now, demands at the lower tiers are sometimes a different matter, and that is where the concerns have arisen. But even there, one of the issues over time is how different the standards for defense components should be from those for civil components. That is partly a matter of policy. If you set higher standards for defense goods, you make it more difficult for someone to produce those goods for you. There may be sound reasons for making defense standards more rigorous because military equipment has to work under more stressful conditions than do most commercial products. That is obviously a question on which there is room for debate.

I would argue that to the extent we can adopt civilian standards, while meeting military requirements, we will have more potential suppliers in the second- and third-tier industries.

I think that is something we should be sensitive to.

Mr. ASPIN. So have you people over in the Pentagon thought about an industrial policy? Mr. Gansler talks about one, but he is not specific about what it would be or how it would look.

Mr. CHU. We have, but in pieces and in dealing with specific problems. We do, of course, have the Defense Production Act, which allows the Department to go to the head of the line. The act also allows the Department in effect to subsidize capacity in certain areas by either guaranteeing purchases or helping to build

things outright. Whether we should be allowed to do so is a matter of some debate.

As I indicated, we are making a major effort to provide information on our procurement plans because we believe that will help industry in its planning. An important concern of the Under Secretary for Research and Engineering, Dr. DeLauer, is the health of the industrial base. This is always a consideration as we go forward with specific weapons decisions.

We want to be sure there is sufficient competition over time in an industry. That is sometimes a problem.

We have not tried to have a single volume wrapped up saying "this is our policy." I think some people would object if we tried to do so and would say with some justice that that is beyond the mandate of the Department of Defense.

Mr. ASPIN. In the areas in which you agree with Jack Gansler, why wouldn't these problems create inflationary pressures even in the buildup we foresee now?

Mr. CHU. I'm not sure that the problems Mr. Gansler identified are as pronounced as he would argue. Some of what he views as a problem I interpret as the result of standard economic phenomena. The market works. We became a less important customer; firms left the industry. When we become more important, we can expect firms to return.

Our interest in providing projections of defense demands, is to make sure people understand we will be a more important customer. We want to encourage them to think about us early in the process. To the extent there are frictions in that process, you will encounter problems. Part of our conclusion is based on looking at capacity utilization rates in various sectors of the economy. At present, these are still fairly low.

Mr. ASPIN. How far does your analysis go, the input/output analysis?

Mr. CHU. We take it out 5 years. In other words, we take the 5-year defense plan and translate it into outlays in the 400 sectors covered by the input/output table. We array the resulting projections in several ways, including an identification of the demands stemming from the main appropriation accounts. I indicated earlier, we provide this breakdown because industry indicates that it is important to them.

Most users are not interested in the whole package, so we give them the sections of interest to them. It is a 5-year forecast, and we try to update it once a year.

Mr. ASPIN. In looking at defense spending you look not just at the primes, you are able to get to the subcontractors?

Mr. CHU. What we do is take, say, a dollar of shipbuilding money and, on the basis of historical experience, split that among the sectors of the input/output table. So for each shipbuilding dollar, we try to figure how much will go directly to shipyards, and how much to manufactuers of weapon systems, to producers of the electronics that go on ships and to manufacturers of some other items purchased directly by DOD and installed by the shipbuilder. Interestingly enough it is something like one-quarter of the cost of a naval ship is spent on electronics or similar things.

Then we apply the input/output table to these direct purchases to determine the derivative demands associated with spending one more dollar on shipbuilding. These resulting estimates of what we call indirect demands include subcontracts and, more broadly, all activity at all lower tiers derived from the prime contract.

The core of our forecasting system is a set of estimates of the share of each defense dollar from each of 50 budget accounts that is spent on the products of various industries.

We show these estimates to industry experts and ask: Do you think this is sensible? Should we do it differently? Have we characterized it appropriately? When we see anomalies, we seek advice on what is going on and how the estimates should be modified. This process typically is triggered when defense spending is projected to be large in an industry for which we think it is small.

So we don't start out by splitting defense outlays between the prime contract and subcontract levels. We look instead at final demand and track that to the industrial sectors in which the money will be spent. We then use those direct expenditures and the input/output table to compute indirect demands, which include the subcontract level. I should add that what is prime and sub is often a contractual decision as opposed to an economic one.

Mr. ASPIN. What about labor, does this analysis go to categories of labor?

Mr. CHU. We project defense and defense-related demands for some 60 categories of skilled labor. We also try to track about 70 categories of crude materials.

Mr. ASPIN. OK, let me ask you about the issue of the index rate. Why is it, in your view, that the inflation index in defense is that different from the inflation index for the general economy?

Mr. CHU. Well, that hasn't always been the case. Of course, we have these BEA indexes only back to 1972. As I recall, during the early 1970's, the two indexes moved fairly closely together; in the late 1970's they diverged.

Mr. ASPIN. Moved together meaning they were the same or they just moved together?

Mr. CHU. They were not precisely the same. There was a year in the early 1970's, I believe, when the BEA index was a little low relative to the GNP deflator.

In the late 1970's they diverged. When I say diverged I am speaking about the index excluding pay and fuel costs because those are separate problems. For the overall DOD index, rising fuel and pay costs accounted for much of the divergence from the GNP deflator. We are a somewhat heavier user of fuel, and our pay policy is a product of administration recommendations and congressional actions.

So changes in military pay may not track with wage trends in the private sector. Those differences are important in the final answer, but for the nonpay and nonfuel accounts, the indexes still diverged. We don't have a good explanation of why that happened. I believe one element was the overheating that occurred in the aerospace industry at the time. In the years ahead, we ought to see the defense and nondefense inflation rates coming back down or at least moving closer together, although not necessarily year to year.

I would not attempt to explain year-to-year variations in the indexes. We have treated that as a problem; we are looking into it. At the moment, we treat such variations as an observed fact about which we cannot do much in the short run. But we have tried to insist that the defense program be priced assuming the variations are going to continue for at least the intermediate future.

I wish I had a good explanation.

Mr. ASPIN. What happened in the aerospace industry in the late 1970's?

Mr. CHU. At least as I would interpret it, we had fairly high rates of production of aircraft for the Air Force and extremely high rates of commercial aircraft production. A major manufacturer was developing two new models of aircraft and, in anticipation of large sales, was taking out inventory positions on parts, landing gear, and so forth.

As all those demands converged, suppliers to the aerospace industry experienced constraints in production capacity and leadtimes lengthened. It was never clear what the leadtimes meant because some of the orders did not require that money be put on the table when the order was placed. But in that period, all these factors were coming together. Then we had a sharp downturn in demand for commercial airliners, both existing and new models, and a different picture emerged.

Mr. ASPIN. Do you have a forecast of where the DOD price index is going to go?

Mr. CHU. We do have an official forecast for what are called major commodities—meaning major weapons systems. We project that this index will increase more rapidly than the GNP purchases deflator used in the forecast.

Mr. ASPIN. It is higher?

Mr. CHU. The official forecast is somewhat higher; yes.

Mr. ASPIN. This is forecast out through when?

Mr. CHU. We do it for 5 years, and then we really straightline beyond that for ships, for which outlays sometimes run over 7 years. The reason we need the forecasts is that, as you know, when the Congress appropriates money for ships or aircraft, it allows for anticipated inflation. Obviously one reason we prefer to be cautious on this issue is that in the decade of the 1970's, the Department was constrained to using the OMB forecast. To put it most charitably, the OMB forecast was right, on average, 1 year in 10. The effect on our program when OMB was wrong—or when we got a budget that embedded that set of assumptions—was that people cut back on support equipment or spares or on other items needed to operate a weapon system in order to adjust for the fact they didn't have the money in the procurement account.

So we are trying to be conservative in our inflation projections.

Mr. ASPIN. How much higher are you than the official forecast for the CPI?

Mr. CHU. We are one-half percentage point above the increase projected for the implicit GNP price deflator.

Mr. ASPIN. Do you know what you are forecasting for inflation?

Mr. CHU. The overall deflator, which includes pay and fuel, was forecast to increase by 3.6 percent in 1984. The forecasts for the following years are in the range of 5 percent. For 1985, we were—this

is as of last February 1—forecasting 6.1 percent for all accounts; and then descending toward 5 percent out into 1988. These rates are comparable to inflation rates for the economy as a whole. The projected inflation rates for defense purchases, excluding pay and fuel, are as I said, about one-half percentage point above the implicit GNP price deflator. The inflation rate for major defense commodities was forecast to be about 1.5 percentage points above the GNP implicit price deflator.

Mr. ASPIN. Why is there this difference, the divergence between the CPI for the economy as a whole and defense?

Mr. CHU. I am not sure there is a difference with the CPI; our comparisons have been with the GNP purchases deflator. I would not argue that the difference should be permanent. We did see a difference in the late 1970's, and we are being careful not to get ourselves in trouble by assuming that problem, whatever caused it, is going to go away. As I said, this is a subject we are looking into because it is hard to explain the year-to-year differences in the BEA defense index and economywide inflation rates.

To defend the BEA deflator, our situation is a lot better than it was in prior years when we had no defense-specific deflator. BEA goes to a great deal of trouble to try to construct the best index it can for this marketplace.

Mr. ASPIN. Leaving aside the year-to-year fluctuations, it seems to have run higher than the index for the entire economy.

Mr. CHU. In the last half of the 1970's, there was a divergence. In the first half, the two indexes moved more or less together.

Mr. ASPIN. OK.

Mr. CHU. So I would not argue that the divergence is permanent.

Mr. CLARK. I am looking at the testimony that George Brown will be giving shortly and he shows that the defense deflator in the 1980's is considerably higher, nearly twice as high as the GNP deflator. So the difference continues after the latter part of the 1970's.

Mr. CHU. Oh, yes, I am not saying it stopped in that period of time. The divergence has not come down as much as I would have expected. But I can't explain the phenomenon. We wish we could.

Mr. ASPIN. Basically you don't see any reason why in the normal scheme of things it shouldn't be the same, and what we are trying to explain is the phenomenon of the late 1970's, is that right?

Mr. CHU. In theory. I have no theory that says——

Mr. ASPIN. No theory for why it is different?

Mr. CHU. That is right. For the overall defense budget, you get differences because of our separate pay assumption. Our pay rates do not necessarily track private sector wages. They could be higher; some have argued we will need higher wage rates in the future.

Mr. ASPIN. Or it was lower than the economy for the 1970's and with the big pay increases in 1979 and 1980 it was higher.

Mr. CHU. Yes; and, similarly, we have the fuel price effect. We don't pay a different price, but fuel costs account for a larger part of our budget than they do in the GNP purchases deflator. The divergence may result from that compositional issue. The deflator would clearly be different if we bought a different set of goods. Perhaps if we broke the GNP purchases deflator into components, we could see an explanation. But I don't know.

We haven't gotten far on that work. We may see that the difference is all compositional because we are buying things at the high end of the scale.

Mr. ASPIN. One of the arguments that some people have made—maybe with inflation coming down now it is not made with the same degree of fervor—is that we ought to use a different inflation index in calculating real growth in the defense budget. In other words, we shouldn't use the official numbers for Government-wide spending, we should use a different number for defense. Is there any change in policy about what we use?

Mr. CHU. No, sir, except for the fact we are permitted, as we have discussed, to have a major commodity index. So we are permitted to have a——

Mr. ASPIN. To have a major commodity index.

Mr. CHU. Yes; and it is different—higher in the present case—from the GNP purchases deflator. So to that extent there is a difference, yes.

Mr. ASPIN. All right. Let me go to the issue of longrun economic growth. Leaving aside the very important issue of how defense is paid for—which could create problems for economic growth—the issue I would like to raise, and have been raising with other witnesses, concerns the fact that relative to our trading partners and economic competitors we spend more on defense. In Japan, we have the most stark case. Japan spends less than 1 percent of its GNP on defense.

Does it not have an impact on our rate of economic growth to spend 5 or 6 percent of GNP on defense, with Japan spending less than 1 percent of GNP on defense?

That is an awful lot of resources which we are funneling toward the production of defense goods and the Japanese are funneling in other directions. Obviously not all of that will go into investment, but a chunk of it will and if you developed a policy to push some of that into investment you could probably capture a bigger chunk in investment.

Has this not had an impact? I am not saying that it is the only explanation for why Japan is doing better in productivity in some rather notable products over the 1970's, but is this not a contracting factor?

Mr. CHU. I have not seen persuasive evidence that it is. I am generally familiar with the simple cross-national comparisons made. People who make such comparisons tend to leave out the data points that contradict the theory. Taiwan, for example, spends a high proportion of its output on defense, but it also has had a very high growth rate. I am also leery of cross-national comparisons because the underlying explanation may be something else and there may be just an accidental liner between the variables you're correlating.

It is particularly disturbing when cross-national comparisons cannot be sustained with the time-series data from a particular country. If you look just at the United States, there are a lot of explanations for the decline in growth over the last 15 years.

Defense spending as a share of GNP also declined over that period. So I would argue it is very difficult to construct simple

theory that links the proportion of GNP we spend on defense to the rate of economic growth we have sustained.

Japan and Germany are often cited as examples. In looking at these cases, we have to keep in mind, not just the rates of growth of output per capita, but also the fact that the United States has a significantly higher level of output per capita than does Japan.

In examining growth rates, you have to consider the base from which they started. If we look at the broader historical context, what we have are two countries that lost their capital stock in World War II but retained a very skilled labor force. Partly with external assistance, they reconstituted their capital stocks and, therefore, were able to have a very high observed rate of growth. But what they were really doing was putting back something that was shattered by the war.

If that is true—this is a conjecture on my part—you would expect to see their rates of growth decline over time. We are seeing that. In Germany, the rate of growth has leveled off quite considerably, and even that of Japan has slowed down.

So I am not persuaded that the amount of GNP the United States devotes to defense is an important explanation of our growth performance in recent years or need be an important factor in our future performance growth per se. Nor has Dennison's work necessarily suggested that defense spending is very important in that regard.

Mr. ASPIN. Let me pursue this a little further. I think clearly you can have high economic growth and high defense spending depending on how much you can convince your population not to consume.

Clearly if we wanted to tell a generation of Americans that their consumption level should be less we could tax a great deal of that money, put it into defense, put a big chunk into investment for future economic growth and everything would be all right.

So yes, you can have higher defense spending and longrun economic growth. The correlations don't necessarily mean that if you are spending high in defense you are not growing. Something else may be going on. The Taiwan case I don't know about, but clearly other things can be going on.

When you raise the issue of time comparisons with people, they claim of course that there are lags—the effect is a lag effect. I may have in the 1970's not very good economic growth at the same time that you don't have very high defense spending, but what they are saying is it is a catch up from the past, not what is going on at the present time.

The problem I have with the point of view that it doesn't matter, is that it would be hard under any economic theory to think you could take 5 percentage points of gross national product with no effect. The difference between 6 percent growth GNP going to defense and 1 percent of GNP going to defense is that 5 percent, and somehow it is assumed that you can either spend it on defense or not, and it just doesn't matter.

That is an awful lot of——

Mr. CHU. I am not saying it doesn't matter. I was trying to argue that it need not affect—historically has not affected—the rate at

which our economic base and our productive capacity expands, which is a somewhat different kind of statement.

Mr. ASPIN. OK.

Mr. CHU. That is not to say it doesn't have to come from someplace. It does. It may come from unused capacity. It may come from capacity we are not using to produce other goods at a given time in the business cycle. Employment will then be higher than it would otherwise be. But that is a different plane than statements about how the proportion of GNP devoted to defense affects, in an important way, the rate at which our potential productive capacity expands over time.

I would argue that it is tough to explain U.S. growth performance, or any other country's, on the basis of defense spending.

At the extreme, take a case like Israel—that is a different matter. But in that case we are talking about spending 30 or 40 percent——

Mr. ASPIN. I am talking about our level of spending versus the Japanese. I am talking about the specific comparison there. The numbers of engineers and technicians, scientists of various kinds that we have devoted to defense versus the miniscule numbers devoted by the Japanese—what does that leave in terms of scientists and engineers devoted to consumer goods? I cannot believe that it doesn't have some impact on the quality of the Toyotas versus the quality of Chryslers.

Mr. CHU. I think on that specific issue—and I will come back to your other point—we want to be careful not to look just at demand. Yes, we may demand a high number of engineers and scientists, but we also have to consider supply phenomena over time. I would argue that market works. It works both ways. I can recall when I moved to Los Angeles in the early 1970's the newspapers were filled with stories about the great national disgrace of engineers having to work washing cars. That situation turned around toward the end of the decade. So there is a supply side to the engineering and scientific personnel problem. Supply responses do have a lag, which again is why there is great merit to pursuing a steady course in these matters so we don't keep changing signals.

Mr. ASPIN. Yes; but still it seems to me that the figures show that whereas about 6 percent of our gross national product goes to defense, something like 25 percent of the scientists and engineers in this country are working in defense. So yes, somehow these other things ought to come in but——

Mr. CHU. If I can come back to your broad question, the operative policy question is if we cut defense to, say, 1 percent of GNP would those things that are judged to produce future growth—like investment—rise? I think if we step back and look at U.S. investment patterns over time, the answer is "not necessarily." U.S. net investment has been a relatively stable share of GNP over a long period of time. In fact, there has been a controversy about why we don't seem to invest as much as other nations do.

Mr. ASPIN. You say, going back a long distance in time, where do you go back to?

Mr. CHU. Several decades.

Mr. ASPIN. Basically this phenomenon—a fairly high level of defense spending in the United States taking a decent chunk of GNP— this phenomenon is post-Korean war.

Mr. CHU. Yes, sir.

Mr. ASPIN. So any comparisons with the 1950's——

Mr. CHU. No; in fact if you look at the broad historical record, one of the interesting questions is why, for some period of time, the country seems to have invested less than at least some other modern developed countries are now doing.

I am not sure why that is so. My reading of the literature is that people are not sure why that is so or what the effects are. All I am saying is that if you cut back defense spending dramatically, you would not necessarily see spending go in the directions that would promote economic expansion through investment.

Mr. ASPIN. Correct. If you did it with any other Government policy associated with it, presumably a percentage of it would go to investment. Now probably most of it would go to consumption, but if you accompanied it with a direct Government policy——

Mr. CHU. Obviously. But you could have a direct Government policy in the absence of such a cut if you chose to do so.

Mr. ASPIN. Then you are asking for a real reduction in the standard of living of most Americans.

Mr. CHU. Not necessarily. If, for example, part of the price is being paid out of unused capacity, you don't have quite that problem. Now at full employment—I am not trying to duck the issue—at full employment, yes, it has to come out of something. Something has to give. We have to pay for it somehow.

There isn't a free lunch. We would argue we get something important back in return that is worth paying for.

The only point I am trying to make is that both history and theory suggest that the rate of expansion of productive capacity over time need not be retarded by defense spending.

Mr. ASPIN. No; it need not. The question is, has it? Is it an explanation?

Let me pursue this again. Take a full employment case—whether the economy is or is not at full employment is a separate issue to be pursued by good fiscal and monetary policy. You yourself said in your testimony that you shouldn't use defense as a stabilization tool. OK, fine. Assume we use other stabilization tools to either produce full employment or if we don't it is because we are not pursuing other policies.

So you take the full employment case, then start looking at GNP shares. How much goes to consumption, how much to investment, how much goes to government of various kinds?

We have spent more of government, at least on the defense part of government, of GNP shares than the Japanese.

Mr. CHU. Yes.

Mr. ASPIN. Where does that GNP share come from? Well, it might come from other Government programs.

Mr. CHU. Yes.

Mr. ASPIN. In which case the cost of the United States bearing the big defense burden compared to Japan is that our senior citizens, our poor and our welfare people are less well off in this coun-

try than they are in Japan. The cost of the defense is borne by those folks.

OK, a second possibility is that it might come out of consumption. We would just spend less—5 percentage points less on consumption than the Japanese in this case. Which means we have the same investment, the same level of nondefense Government spending, but higher defense, so lower consumption—which means that if you can convince a generation of Americans that they should sacrifice a little personal gain themselves for the future of the country so that we can be strong in investment as well as strong militarily with high Government spending you end up with a solution.

In all these cases you are right, it need not be the outcome, but assume you cannot convince the American public or that the American public is unwilling to have a lower standard of living. Say this generation is not in the mood to sacrifice for the future and to sacrifice for the United States to be a strong military power. In fact, they look to Japan and say I want my standard of living, my consumption, to be what the Japanese have.

Let's suppose that the pressures are such that you cannot get—that you don't want to have the senior citizens and the welfare recipients doing as badly as they are in Japan.

Mr. CHU. If I might interrupt, that is one thing that is not an outcome, because those are transfer payments for the most part. Transfer payments are a matter of how much you want to transfer. That is not affected by the share-of-GNP issue.

Mr. ASPIN. It is but——

Mr. CHU. Consumption is; no doubt about it. Investment might be, but as we construct the budget, the problems you are all citing mostly involve transfer payments.

Mr. ASPIN. They are transfers, but to transfer you have to transfer to somebody else who considers it a consumption.

Mr. CHU. But in the end—what you are really honing in on—at full employment the price is paid either out of investment or consumption in the aggregate. We can always change the composition of consumption with transfer payments.

Mr. ASPIN. But the problem from a public policy standpoint is that when you tax people who are producers and you spend it on defense or you spend it on food stamps—that part doesn't matter—because you still have to take it away from these other people over here, taxpayers.

I cannot believe that 5 percentage points of GNP over all those decades does not matter.

Mr. CHU. It matters in the sense that if we had not taxed ourselves to pay for that, we could, other things being equal, have had a higher rate of consumption. We would also have had a less secure situation, and what we are buying with defense expenditures is security. We consider that an important commodity.

The testimony of many young Americans to their feeling of pride and patriotism for their country and the kind of society we have suggests it is worth paying a tax of this size to support. So we bought that particular mix of goods.

The Japanese case is a special one, a case that early U.S. postwar policy helped encourage.

Mr. ASPIN. All right.

Mr. CHU. The issue of whether we could have a larger consumption stream over time is a somewhat different question from our ability to affect the rate of growth of the economy as a whole. That is a somewhat separate problem, and I would argue that it is not all clear that this level of defense spending relative to GNP presents any significant difficulties in achieving, given our limited knowledge of how to do so, high rates of economic growth.

Mr. ASPIN. We don't know very much about the problems of economic growth, and we don't have a lot of answers about what to do except to say, if you do increase investment——

Mr. CHU. But the issue I point to is the connection between cutting defense spending and increases in investment. If you look at history, the proportion of GNP spent on defense did decline in the last 10 years or so, but we did not see any rate of increase in GNP given to net fixed investment.

Even if you undertake a Government policy to encourage investment, you have to worry about the degree to which the marketplace does work. Will you succeed only in displacing public investment that might have been undertaken privately in the first place?

If you want to go back to basic economic theory, then all the articles we talked about on what the national rate of investment really was and the golden growth path and whether we are on it, and so on and so forth.

Mr. ASPIN. I can't remember it either, but I think that if you do, it is quite clear that just cutting the defense budget—assume that peace breaks out and you can go to a 1-percent GNP—clearly, just cutting the defense budget won't mean a big increase in investment all by itself.

You have to accompany it with a policy to shift some of the money, and it would have to be a part of a deliberate policy. You are right, you have to be very careful how you view that policy.

Mr. CHU. It is not always clear that fixed investment is the answer.

Mr. ASPIN. It seems to be about the only thing we know how to do.

Mr. CHU. We certainly feel satisfied when we have more of it.

Mr. ASPIN. Otherwise you are stuck with a position of saying "We don't know what it is, and we can't do it anyway."

Mr. CHU. The broader question is, How do you promote economic growth? I would urge that we start out by specifying what policies support that objective rather than by focusing on a particular financing approach to increase one set of accounts in the economy at the expense of another. We are not convinced that simply increasing investment by itself is going to result in broader economic growth.

Take the Soviet example. They have invested heavily in certain basic industries yet have not achieved high rates of growth.

Mr. ASPIN. Investment might mean more than just capital investment.

Mr. CHU. It might well.

Mr. ASPIN. That takes money, too. If you adopted this policy, and you could take that 5 percent of GNP, you wouldn't want to put it all into buildings and machinery, you would want to spend some of

it on education and on R&D, and you would want to adopt an across-the-board policy of what you do with that money.

Mr. CHU. Yes, sir, although again, I would urge, if economic growth is the objective, we ought to start by asking how we can best promote that objective. Some of the options have very little to do with raw resources, but with the rules of the game.

Some would argue deregulation is a useful tool. That has spurred growth in some cases.

Technological innovation may not be a function of how much you spend, but of how you spend the money.

Reduction in transport costs in the late 19th century, for example, were a great stimulus to the growth of large-scale industries which used then-advanced technologies.

Mr. ASPIN. Let's go on to another subject. One of the things that you mentioned is the instability in defense spending, that you don't want to use defense spending as a stabilizer.

Part of the problem is that public opinion is very volatile on defense?

Mr. CHU. Yes, sir.

Mr. ASPIN. It seems to me that we are not doing a very good job of how we deal with that volatility. We keep bemoaning the volatility and keep talking about agreements between the Congress and the President about a constant rate of growth in defense spending.

We can argue about the numbers, but people seem to think you need an agreement between Congress and the President that we will have a 5-percent rate of growth for 5 years. That ignores the fact that what drives the instability is public opinion, and that public opinion might shift, and in which case any compact between Congress and the administration would break down immediately because probably both of them would want to change the terms of the contract.

Suppose we decided on a 4-percent real rate of growth in defense spending, and all of a sudden the deficits push up the interest rates, and then the whole economy looks like it will stall out and we are into another recession. That 4 percent won't hold.

The pressure is going to come to cut Government spending and you will not have a 4-percent real increase in spending. On the other hand, suppose the Soviets do something nasty, the 4 percent won't hold either because everybody will want to increase it.

I think that rather than talking about maintaining a level of economic growth that is constant, we ought to recognize, at least for the foreseeable future, that defense budgets are going to be somewhat driven by events and figure how do we define defense budgets in that kind of world.

Suppose we decided we wanted to figure out some way in which we could do this, where there is some part of the defense budget that can expand and contract without a lot of repercussions, because starting and stopping production lines or speeding up or slowing down production lines is not a very good idea.

Are there other parts of the budget that could be cut back? I know people say "Well, you are cutting O&M and readiness," but of course, those are the things that you can probably pick up again quickly with minimum problems, unless they are not minimum problems.

Mr. CHU. I would argue against making the adjustments on the O&M and readiness side, because the problems can be quite substantial. What happens is that people say "It will be temporary. We will cut back flying hours; don't worry, we will return to the program next year." Next year it could be very painful to get that kind of money back.

What you gradually get from that is a much less capable force, and you are using inefficiently the capital stock you paid for. You are having it run by people not fully trained.

That is part of what we did in the 1970's. We cut flying hours way back. We have had a turnaround on that, and we would like to get close to 20 hours a month, which is the goal that the Secretary announced. That is still below what the Israelis do.

I would argue that the real cost from trying to change the O&M accounts around in this way is that you have a much less capable force than the one you think you are paying for. The argument I would make is, that if the Nation decides it wants less defense, we need to be explicit about where. Are there accounts that you can try to manipulate in the short run?

One of the problems that we as a department face—and some members of this committee have been sympathetic—is that budgeting is done on a very shortrun basis, 1 year at a time.

I recognize that the kinds of factors you describe make it extremely difficult to reach, and even more difficult to enforce a longer run view. But I do think that if the Department were under something like the 2-year budget that some people on this committee have endorsed, we could minimize these shortrun kinds of problems. While not locking the Congress or the public in unduly, it would allow us to focus our attention more on the longer run issues.

I would argue the whole debate would be improved, if we went for an intermediate compact, and the longrun compact were more subject to the kinds of pressures you indicate.

Mr. ASPIN. Even with that, though, it is not. I mean that may help you a little bit with the flutters, but not with major changes.

You get a 2-year budget and the Soviets invade Iran. The administration will be in for a supplemental. We have already seen administrations that have pulled back entire budgets and resubmitted. Jimmy Carter had a budget and when interest rates went through the ceiling he pulled it back and presented a whole new budget. These pressures come from the public, and it is not necessarily the Congress that responds.

What I am saying is that, yes, the ideal thing to do is to decide what the rate of growth is and then adjust the whole defense budget to that rate of growth, but the problem is that that rate of growth assumes that the future is going to be like the present.

One thing for sure, the future isn't going to be like the present. I don't know why it is. We adjust the whole budget for a 3-percent rate of growth and all of a sudden the world changes and we are adjusting it to a 5-percent rate of growth and then we are back to a 3-percent rate of growth adjustment.

It seems to me that, yes, there are difficulties with adding and subtracting in any of the accounts, whether it is personnel accounts, procurement accounts, the O&M account, whatever ac-

count, but it seems to me we ought to think about what areas in the defense budget are subject to the least amount of costs with those fluctuations, and try to figure out a way to design a budget assuming that people are looking to cut defense but somehow between now and the end of the decade, they will want to increase defense spending again.

What can we take out now and put in later on with less cost than starting and stopping production lines, which is probably the most costly. We ought to decide what is and what isn't the most costly.

Mr. CHU. I am not sure I have an answer to what is least costly, but among the more costly types of changes are cuts in readiness expenditures. You are never quite certain when you need to use those resources. Cuts in the readiness accounts tend to erode capabilities over time.

Mr. ASPIN. One way of doing that is not to apportion the readiness equally among all of the units.

Mr. CHU. We do that. We don't do as good a job telling our story in that regard. We keep forward deployed units at higher levels of readiness, and even among Army units in the United States, we make fine distinctions among the levels of readiness we want them to achieve.

There is a major break between Active and certain Reserve Forces, so we make distinctions between those units as well. We don't keep everybody at the highest readiness level.

Mr. ASPIN. You ought to do more of that.

The point is, if the forces are likely to be needed for a major contingency, you are likely to see it coming. The minor ones, you are not likely to see.

Mr. CHU. We try to make those kinds of distinctions.

The difficulty is that, given that the Department has already made some such distinctions—although some people might quarrel with how we have done it—and given that you have a set of those distinctions already embedded in the budget, cuts in the readiness accounts affect the training of all units, not just the readiness of specific ones. Administratively, since we have already made decisions about what the relative readiness of various units should be, the cuts tend to fall on the training of all our forces—the preparation of soldiers and tactical air crews to send to Europe, for example, or of naval aviators to serve on the carriers we keep positioned in various parts of the world. This happens even within fairly small swings in the shortrun budget level. That is very inefficient.

Mr. ASPIN. I would agree, but I am arguing, if you are going to cut, make sure it doesn't occur in something like that.

Mr. CHU. That is a fair challenge.

Mr. ASPIN. Otherwise we are going to end up with the cuts occurring wherever anybody happens to want them, rather than asking where are cuts likely to do the most amount of damage and be the hardest to start up again.

Maybe ammo stocks—people would argue that ammo stocks is less dangerous than training, because they are a pipeline operation.

Mr. CHU. Of course, you have touched on a situation in which the Government agrees that items like ammunition might be more

susceptible to shorter run changes. Such a policy is acceptable if you are comfortable with your stockage position to start out with. If you are not, you are left with a Hobson's choice.

Mr. ASPIN. There is going to be no answer to this, and people talk about how you ought to agree on a rate of growth and stick with it. That will carry so far. Looking at the events of the last 6 months, we could not have anticipated that, and all of those things have tended to drive the defense budget in different ways, so it seems to me that we—including you guys in the Defense Department—ought to think through these ideas and then talk to Congress about it.

There is a tendency to stonewall over there, and say, Look, there is our defense budget, by God, this is what we think is enough to defend the country. If you want to cut it, the blood is on your hands if our defenses are not adequate.

The dialog needs to be there.

Mr. CHU. In all sincerity, a 2-year budget would help the dialog. The Department finds itself constantly dealing with budget issues, much as the Congress does, and as a result, everyone is driven to a very shortrun orientation. What you are posing are the longer run kinds of questions, and I think the situation would be helped if we could find a way to get a stronger intermediate term, 2- or 3-year perspective on the more challenging and important questions we need to confront.

Mr. CLARK. I think you have to leave pretty soon.

What you said in your testimony is that a billion dollars' worth of defense spending creates about 35,000 jobs.

Mr. CHU. Right.

Mr. CLARK. I understand that billion dollars is defense spending on goods, not including pay or retirement. It is a billion dollars spread across all of the other military accounts.

Mr CHU. Right.

Mr. CLARK. Neither pay or retirement, but just about everything else?

Mr. CHU. The absolute figures will depend on which set of models you use and on the particular assumptions you grind into them. The conclusion I would want to stress is that when you compare defense purchases with other Federal purchases excluding transfer payments, both produce about the same number of jobs per dollar spent.

Mr. CLARK. The problem I have with that is when CBO does that same thing, when they exclude personnel and retirement, they only get about 20,000 jobs. There is a big discrepancy there.

Mr. CHU. We have been through that with them as well. Some models have produced numbers in the 60,000 range.

Mr. CLARK. Do you suggest that your 35,000 is at the low end?

Mr. CHU. It's in the lower end of the range. There is one consideration—among others—That you should be aware of. Some estimates are calculated from the establishment survey of employment; others use the household survey of employment. Those yield different results, but they don't change the basic conclusion I offer, which is that a dollar spent on defense purchases will yield the same number of jobs as a dollar spent on nondefense purchases.

An article in last Sunday's New York Times discussed why these two series differ, both in their estimates of the total number of jobs created and—what is germane to this discussion—in their interpretation of how changes in the business cycle or in the level of government spending affect employment levels.

That may be an element in the difference between our estimates and those of the Congressional Budget Office.

Mr. CLARK. It roughly doubled.

Mr. CHU. Yes; you have to be careful with some estimates.

Mr. CLARK. Your estimates would be higher than 35,000, higher than the pay account?

Mr. CHU. Yes.

Mr. CLARK. CBO's comes out at about 25,000?

Mr. CHU. Yes.

Our estimates are calculated using an input/output approach in which we look at both direct and indirect demands. I do not recall the extent to which CBO attempts to do that sort of thing.

Mr. CLARK. You are comparable on that basis?

Mr. CHU. There is also the more Keynesian type of induced spending.

Part of the explanation may also lie with the two different series that are used to estimate how many jobs there are in the economy. It is awkward that our statistical processes, Government-wide, produce different answers.

The basic conclusion is that, in terms of its job-creating effects, defense spending is, on average, neutral relative to any other kind of Federal purchases. The differences in models will, however, change the absolute number of jobs estimated.

We have made these estimates with a variety of models and you can produce numbers in the 60,000 range. You also have to understand whether people are talking about an average over a period of several years or about an impact multiplier, for example, the first year effect.

Mr. MULTOP. You said some models can generate 60,000 jobs. What are they?

Mr. CHU. You can get much higher numbers.

Mr. MULTOP. All of the ones I have seen, including the ones out of your system, are ——

Mr. CHU. The one we would stick to is 35,000.

Mr. MULTOP. Who gets those higher numbers?

Mr. CHU. I don't want to blame the people involved.

We have used both Chase and Wharton models to look at this question, and I would be delighted to share those numbers with you.

Mr. MULTOP. You would, yes. If you could submit them.

Mr. CHU. These are our manipulations of their models.

Mr. MULTOP. If you could submit those.

[The information referred to above follows:]

FORECASTING MODELS

We found that the Wharton Econometric Forecasting Associates model implied a reduction of about 42,000 in civilian employment in calendar 1983 if defense spending is cut by $1 billion (1982 dollars) in that year. Assuming that defense spending remains $1 billion (1982 dollars) below the base line, the model implies an average

reduction in civilian employment of about 45,000 over the three years 1983 through 1985. The corresponding estimates from the Chase Econometrics model are about 28,000 in 1983 and an average of about 63,000 over the years 1983 through 1985.

The employment multipliers implied by the Wharton model were computed by staff in the office of Program Analysis and Evaluation in the office of the Secretary of Defense in consultation with Wharton Econometric Forecasting Associates. The multipliers for the Chase model are taken from David Cross and Edward Friedman, "Model Notes II: Multiplier Properties of the Quarterly Model," Chase Econometrics, Macroeconomic Forecast and Analysis, January 1983.

Mr. MULTOP. I had only one other question. You said in your testimony that $1 cut out of defense spending only reduces the deficit by 50 cents. Is that true of nondefense spending as well?

Mr. CHU. Transfer payments have a larger effect.

Mr. MULTOP. Thank you.

Mr. ASPIN. Thank you.

Our next witness this morning is George Brown.

We had a witness who was supposed to be here from the Council of Economic Advisers but the White House thinks he is going to say the wrong thing about the deficits so they won't let him come.

We are happy and pleased to have Mr. Brown here who is the group vice president for Data Resources, Inc.

Welcome, sir, and let us start with your opening statement.

STATEMENT OF GEORGE F. BROWN, JR., GROUP VICE PRESIDENT, DATA RESOURCES, INC.

Mr. BROWN. Thank you, Mr. Chairman.

I will try to summarize my testimony since I have distributed written copies of it to you.

Our Nation is now 5 years into the first period of sustained real investment in its military forces since the end of World War II. Built upon a strong consensus regarding national security requirements reflected in the budget submissions of both the previous and current administrations and in the decisions of the Congress, this investment program has increased the Defense share of the Nation's gross national product from a post-World War II low of 4.6 percent in 1979 to over 5.5 percent this year.

The positive real—inflation adjusted—rates of growth in defense spending since 1979 reflected in table 1 have reversed a three-decade trend toward lower real levels of defense spending that has been interrupted only three times since the Korean war, in 1957, in 1961-62, and during the Vietnam buildup of 1966-68. Furthermore, recent budget decisions have established a basis for continued real growth in defense spending, with defense obligational authority substantially above outlays as a result of the concentration of spending within the weapons procurement accounts.

While the current and projected defense shares of gross national product and Federal Government spending remain low by any recent historical standard except that of the late 1970's, the increased emphasis on defense spending has forced an examination of its economic impacts. This examination has focused on not only the ways in which defense spending decisions impact upon the economy, but also on the ways in which overall economic conditions impact on the costs and feasibility of defense programs.

Both questions assume increased importance as debate begins on the fiscal year 1985 budget, with the economy now showing solid

signs of recovery from the devastating impacts of the 1980–82 recession and policymakers facing the challenge of identifying the mix of fiscal and monetary policy which can sustain the recovery without reigniting inflation. The obvious focal point of the fiscal year 1985 budget debates will be the Federal deficit, now approaching $200 million and 5.5 percent of the U.S. gross national product.

From the analyses of defense spending and its economic impacts which have been completed over the past several years, several clear conclusions have emerged. These conclusions and their implications in today's environment provide important insight for the questions which must be examined in the context of decisions on future DOD programs. In particular, six issues can be identified: The ability of the economy to support defense programs; the economic impacts of defense spending; the impact of defense spending on employment; the impact of defense spending on the Federal deficit; the relationship between defense spending and inflation; and the ability of the defense industrial base to support ongoing and planned defense procurement programs.

From today's base or even considerably expanded levels of defense spending, it is clear that the Nation can "afford" the levels of defense deemed necessary on national security grounds. Current and proposed levels of defense spending can be accommodated without threatening the long-term health of the U.S. economy. At the same time, however, it is essential to recognize that such spending is not costless; the key question to be addressed is the way in which defense spending is financed. The issue of financing defense spending becomes particularly important given present monetary policies, which are unlikely to accommodate large deficits as the recovery continues.

The contrast between the long-term economic impacts of the choice between financing defense spending by increased income tax collections or reduced spending in other areas and by increased deficits is of particular importance in this transition year. With the defense bill paid for by increased personal income taxes, given the likely response of the monetary authorities to the changed deficit outlook, resources are principally drawn from consumption, leaving the rate of capital formation essentially intact.

On the other hand, if deficits are allowed to increase, interest rates are driven up by the combination of increased economic activity and monetarist policy, substantially reducing housing starts, durable goods purchases, and business fixed capital formation. The consequence of these reductions is a loss in the potential gross national product in future years, in turn reducing the Nation's ability to increase standards of living, maintain its competitive position, and meet future defense needs. This conclusion in no way implies that defense spending is bad for the economy; rather, it suggests the importance of fiscal policy choices which insure that no damage is done to long-term growth prospects by programs designed to meet existing challenges to our national security.

The environment of 1980–83 has been one in which the increased levels of defense spending which have occurred could be readily accommodated as a consequence of the considerable slack which has existed within the economy. During this period, unemployment grew from about 7 percent in 1980 to over 9.5 percent, and manu-

facturing capability utilization declined from over 85 percent in 1979 to under 70 percent at the end of 1982. Increased levels of defense spending have, in fact, been among the few components of final demand which contributed to the start of the recovery. Federal Government spending, with defense an important component, and consumer spending on nondurable goods and services were the only two major components of gross national product which increased during 1982, with such other factors as consumer durables spending, nonresidential fixed investment, residential fixed investment, exports, and State and local government spending all decreasing. The defense spending increases which have occurred have added to real gross national product and employment without any significant adverse impact on inflation.

This second conclusion is not intended to suggest that defense spending be viewed as a preferred instrument for stimulating growth or employment. Defense spending decisions should be based on security considerations alone. It is, however, clear that a consequence of the defense budget decisions which have been implemented has been increased economic activity and jobs.

The impact of defense spending on employment is among the topics which have received careful examination. The conclusion emerges that defense spending is approximately equal in its employment impacts to the average mix of economic activity across the various sectors of the economy. In terms of direct jobs per $1 billion of production, defense programs generate 15,400 jobs in comparison with an economywide average of 17,400. Taking into account the multiplier effects associated with defense spending programs, an overall estimate of the 1983 jobs multiplier suggests that about 35,000 jobs have been created per $1 billion in defense outlays.

The impact of defense programs—or any other category of private or public sector spending—can best be understood by focusing on the producing sectors from which output is purchased.

As table 2 suggests, sectoral employment to output ratios vary considerably across the key components of the economy, with the employment intensity of the services and wholesale and retail trade sectors considerably above that of other sectors such as manufacturing. The relative employment impacts of alternative spending programs depend upon the mix of sectors from which output is purchased.

Table 3 compares the distribution currently associated with defense production with that of the economy in aggregate. Defense draws heavily on the durables manufacturing sector, with the durables share nearly three times that of the other components of the economy, and considerably less heavily on such sectors as finance, services, and trade. Across categories of defense spending or between defense spending and other types of public or private sector spending, the impacts on employment cannot be divorced from the underlying labor intensity of the sectors from which goods and services are procured.

These facts account for the widely varying estimates of the employment impacts of defense programs. As in the case with the aggregate long-term economic aspects of defense spending, the employment impacts depend on the level of slack which exists within

the economy and the options therefore available in terms of the fiscal and monetary policies which are implemented in conjunction with defense spending decisions.

More jobs can clearly be created if spending is transferred from defense programs to programs which draw more heavily on labor-intensive sectors of the economy—for example, service sector oriented programs such as health care and education—and fewer jobs would be created if spending were transferred to less labor-intense categories of production, once again underscoring the need to decide upon defense programs from a national security perspective rather than from an economic one. The salient conclusion, however, remains that additional jobs have been created as a result of the recent defense spending decisions.

The fourth general conclusion which emerges from the analysis of defense spending impacts is that defense spending cannot be viewed as either the cause or the cure of today's Federal deficit problem. From a long-term perspective, as indicated earlier in table 1, defense spending has declined in real terms over most of the last several decades. At the same time, other categories of Federal spending have increased significantly in response to various societal objectives.

As a consequence, the defense share of Federal spending has declined from over 43 percent in 1960 to about 34 percent in 1970 to under 29 percent today. From even a near-term impact, noting that the defense share of Federal spending has increased recently, the same conclusion emerges. Between 1980 and 1983, Federal receipts grew—on a current dollar, calendar year basis—by about $104 billion while expenditures grew over the same interval by about $227 billion. Of that increase in Federal spending, only about $72 billion, or 32 percent, is associated with defense.

Both the differential between the growth in expenditures over receipts and the growth in nondefense expenditures dwarf the growth in defense spending. Today's deficits are the product of slowed growth in Federal receipts, due to the effects of the recession and tax law changes, and of the growth across virtually all categories of Federal spending, with defense spending increases accounting for only about one-third of the latter factor.

A similar conclusion emerges regarding the impact of defense spending reductions of future deficits. While it is clear that reductions in any category of Federal spending will lead to reductions in the deficit, the impact is not dollar for dollar. Taking into account changed levels of economic activity, changed levels of tax collection, and changes induced across other categories of Federal spending, it can be concluded that each $1 of reduced spending on defense will result in a reduction of the deficit of just under one half that amount. Given current forecasts of the Federal deficit which total about $620 billion over the 1984-86 period, any plausible reduction in defense spending will still leave a large deficit problem. At best, reductions in defense spending can contribute to reduced deficits as a minor element within a package dominated by tax increases and reductions in nondefense spending.

The relationship between defense spending and inflation is a fifth area of relevance to the overall analysis of the linkages between defense and the economy. When the current administra-

tion's initial defense spending plans were introduced, the potential impacts of added DOD spending on an inflation rate that was then in the double-digit range were among the principal concerns voiced. Today, with the dramatic impacts on inflation of the deepest recession of recent times apparent, the question must be refocused in terms of the potential impacts of defense spending on renewed inflation. While the current regime of loose fiscal policy in aggregate poses a threat of inflation rates above those prevailing today if sustained as the recovery continues through 1984 and into 1985, the contribution of defense spending alone to the inflation outlook is modest.

The more important focus is on the impact of inflation on defense programs. As table 4 indicates, the improved inflation environment has paid large dividends with respect to the rates of increase in the costs of defense programs. Based on statistics collected by the Bureau of Economic Analysis, the deflator for defense programs—excluding the compensation accounts in the DOD budget—has dropped from levels considerably above those prevailing elsewhere in the economy—15.2 percent in 1980 and 11.7 percent in 1981—to levels generally consistent with economywide experiences. This improvement is forecast to continue during fiscal year 1984, with the defense deflator dropping to 4.6 percent, a level actually below that projected for the gross national product deflator.

This improvement in the inflation outlook has been a major contributor to constraining the current dollar cost of defense programs. The outlook for 1985 and beyond, however, is less positive, although the defense deflator is projected to remain well below the lofty levels of the recent past. Three factors are central within this projection: An end to the benefits from deflating energy prices, escalation in the prices of nonferrous metal products central to many defense programs, and wage settlements within the defense-supplying industries above those prevailing elsewhere within the economy. As a consequence, inflation will become a more important factor in establishing current dollar defense budgets in 1985 and beyond than has been the case in fiscal year 1984.

A final set of conclusions relates to the impacts of defense spending across the key industries supplying goods and services to DOD. As was noted earlier in a macroeconomic context, the defense end market has been among the relatively few healthy buyers for many industrial sectors over the past 3 years. A clear consequence of the recession has been the relaxation of concerns which prevailed earlier regarding the potential for defense spending-induced bottlenecks. The recession has provided a lengthy grace period within which defense demands could be accommodated without crowding out private demand or impacting on leadtimes.

That grace period continues today, with manufacturing capacity utilization still well below even the 1980 level despite the strong recovery which has occurred during 1983. While any $250 billion enterprise is likely to encounter bottlenecks in isolated instances, the probability of meaningful, economywide supply constraints remains low over the next several years. At the same time, however, it remains true that the impacts of sustained increases in defense spending on the output requirements of numerous industries are

large, and few of these industries have invested in their capital bases during the 1980–83 period.

The extent of the recovery of business fixed investment during 1984 will be a key factor to monitor in terms of the longer term ability of U.S. industry to accommodate defense demands without impacting on other sectors of the economy.

The grace period continuing today is certainly long enough to permit this investment to be made but it has not yet materialized. In this context, the most important concerns remain within the second and lower tiers of DOD suppliers.

To the extent that a useful summary statement exists across these six key areas of concern, it is that while defense spending has important and notable impacts on various dimensions of economic activity, it is in no way a pivotal element within today's economy. Defense spending influences economic growth, employment, inflation, the deficit, and numerous other measures of national economic activity, but does not dominate any of them. The challenge facing Congress and the administration remains in reality, as philosophically it should, that of determining what levels of defense activity are necessary to meet our Nation's national security objectives.

[Testimony resumes on p. 181.]

[The prepared statement of Mr. Brown follows:]

29-794 O—84——12

PREPARED STATEMENT OF GEORGE F. BROWN, JR.

Our nation is now five years into the first period of sustained real investment in its military forces since the end of World War II. Built upon a strong consensus regarding national security requirements reflected in the budget submissions of both the previous and current Administrations and in the decisions of the Congress, this investment program has increased the Defense share of the nation's gross national product from a post-World War II low of 4.6% in 1979 to over 5.5% this year. The positive real (inflation adjusted) rates of growth in Defense spending since 1979 reflected in Table 1 have reversed a three-decade trend towards lower real levels of Defense spending that has been interrupted only three times since the Korean War, in 1957, in 1961-62, and during the Vietnam buildup of 1966-68. Furthermore, recent budget decisions have established a basis for continued real growth in Defense spending, with Defense Obligational Authority substantially above Outlays as a result of the concentration of spending within the weapons procurement accounts.

While the current and projected Defense shares of gross national product and Federal government spending remain low by any recent historical standard except that of the late 1970s, the increased emphasis on Defense spending has forced an examination of its economic impacts. This examination has focused on not only the ways in which Defense spending decisions impact upon the economy, but also on the ways in which overall economic conditions impact on the costs and feasibility of Defense programs. Both questions assume increased importance as debate begins on the fiscal 1985 budget, with the economy now showing solid signs of recovery from the devastating impacts of the 1980-82 recession and policymakers facing the challenge of identifying the mix of fiscal and monetary policy which can sustain the recovery without reigniting inflation. The obvious focal point of the fiscal 1985 budget debates will be the Federal deficit, now approaching $200 billion and 5.5% of the U.S. gross national product.

From the analyses of Defense spending and its economic impacts which have been completed over the past several years, several clear conclusions have emerged. These conclusions and their implications in today's environment provide important insight for the questions which must be examined in the context of decisions on future DoD programs. In particular, six issues can be identified: the ability of the economy to support Defense programs, the economic impacts of Defense spending, the impact of Defense spending on employment, the impact of Defense spending on the Federal deficit, the relationship between Defense spending and inflation, and the ability of the Defense industrial base to support ongoing and planned Defense procurement programs.

From today's base or even considerably expanded levels of Defense spending, it is clear that the nation can "afford" the levels of Defense deemed necessary on national security grounds. Current and proposed levels of Defense spending can be accommodated without threatening the long-term health of the U.S. economy. At the same time, however, it is essential to recognize that such spending is not costless; the key question to be addressed is the way in which Defense spending is financed. The issue of financing Defense spending becomes particularly important given present monetary policies, which are unlikely to accommodate large deficits as the recovery continues.

The contrast between the long-term economic impacts of the choice between financing Defense spending by increased income tax collections or reduced spending in other areas and by increased deficits is of particular importance in this transition year. With the Defense bill paid for by increased personal income taxes, given the likely response of the monetary authorities to the changed deficit outlook, resources are principally drawn from consumption, leaving the rate of capital formation essentially intact. On the other hand, if deficits are allowed to increase, interest rates are driven up by the combination of increased economic activity and monetarist policy, substantially reducing housing starts, durable goods purchases, and business fixed capital formation. The consequence of these reductions is a loss in the potential gross national product in future years, in turn reducing the nation's ability to increase standards of living, maintain its competitive position, and meet future Defense needs. This conclusion in no way implies that Defense spending is bad for the economy; rather, it suggests the importance of fiscal policy choices which ensure that no damage is done to long-term growth prospects by programs designed to meet existing challenges to our national security.

The environment of 1980-83 has been one in which the increased levels of Defense spending which have occurred could be readily accommodated as a consequence of the considerable slack which has existed within the economy. During this period, unemployment grew from about 7% in 1980 to over 9.5%, and manufacturing capability utilization declined from over 85% in 1979 to under 70% at the end of 1982. Increased levels of Defense spending have, in fact, been among the few components of final demand which contributed to the start of the recovery. Federal government spending, with Defense an important component, and consumer spending on nondurable goods and services were the only two major components of gross national product which increased during 1982, with such other factors as consumer durables spending, nonresidential fixed investment, residential fixed investment, exports, and state and local government spending all decreasing. The Defense spending increases which have occurred have added to real gross national product and employment without any significant adverse impact on inflation.

This second conclusion is not intended to suggest that Defense spending be viewed as a preferred instrument for stimulating growth or employment. Defense spending decisions should be based on security considerations alone. It is, however, clear that a consequence of the Defense budget decisions which have been implemented has been increased economic activity and jobs.

The impact of Defense spending on employment is among the topics which have received careful examination. The conclusion emerges that Defense spending is approximately equal in its employment impacts to the average mix of economic activity across the various sectors of the economy. In terms of direct jobs per $1 billion of production, Defense programs generate 15.4 thousand jobs in comparison with an economy-wide average of 17.4 thousand. Taking into account the multiplier effects associated with Defense spending programs, an overall estimate of the 1983 jobs multiplier suggests that about 35,000 jobs have been created per $1 billion in Defense outlays.

The impact of Defense programs (or any other category of private or public sector spending) can best be understood by focusing on the producing sectors

from which output is purchased. As Table 2 suggests, sectoral employment to output ratios vary considerably across the key components of the economy, with the employment intensity of the services and wholesale and retail trade sectors considerably above that of other sectors such as manufacturing. The relative employment impacts of alternative spending programs depend upon the mix of sectors from which output is purchased. Table 3 compares the distribution currently associated with Defense production with that of the economy in aggregate. Defense draws heavily on the durables manufacturing sector, with the durables share nearly three times that of the other components of the economy, and considerably less heavily on such sectors as finance, services, and trade. Across categories of Defense spending or between Defense spending and other types of public or private sector spending, the impacts on employment cannot be divorced from the underlying labor intensity of the sectors from which goods and services are procured.

These facts account for the widely varying estimates of the employment impacts of Defense programs. As in the case with the aggregate long-term economic aspects of Defense spending, the employment impacts depend on the level of slack which exists within the economy and the options therefore available in terms of the fiscal and monetary policies which are implemented in conjunction with Defense spending decisions. More jobs can clearly be created if spending is transferred from Defense programs to programs which draw more heavily on labor intensive sectors of the economy (e.g., service sector oriented programs such as health care and education), and fewer jobs would be created if spending were transferred to less labor intense categories of production, once again underscoring the need to decide upon Defense programs from a national security perspective rather than from an economic one. The salient conclusion, however, remains that additional jobs have been created as a result of the recent Defense spending decisions.

The fourth general conclusion which emerges from the analysis of Defense spending impacts is that Defense spending cannot be viewed as either the cause or the cure of today's Federal deficit problem. From a long-term perspective, as indicated earlier in Table 1, Defense spending has declined in real terms over most of the last several decades. At the same time, other categories of Federal spending have increased significantly in response to various societal objectives. As a consequence, the Defense share of Federal spending has declined from over 43% in 1960 to about 34% in 1970 to under 29% today. From even a near-term impact, noting that the Defense share of Federal spending has increased recently, the same conclusion emerges. Between 1980 and 1983, Federal receipts grew (on a current dollar, calendar year basis) by about $104 billion while expenditures grew over the same interval by about $227 billion. Of that increase in Federal spending, only about $72 billion, or 32%, is associated with Defense. Both the differential between the growth in expenditures over receipts and the growth in non-defense expenditures dwarf the growth in Defense spending. Today's deficits are the product of slowed growth in Federal receipts, due to the effects of the recession and tax law changes, and of the growth across virtually all categories of Federal spending, with Defense spending increases accounting for only about one third of the latter factor.

A similar conclusion emerges regarding the impact of Defense spending reductions on future deficits. While it is clear that reductions in any category of

Federal spending will lead to reductions in the deficit, the impact is not dollar for dollar. Taking into account changed levels of economic activity, changed levels of tax collection, and changes induced across other categories of Federal spending, it can be concluded that each $1 of reduced spending on Defense will result in a reduction of the deficit of just under one half that amount. Given current forecasts of the Federal deficit which total about $620 billion over the 1984-86 period, any plausible reduction in Defense spending will still leave a large deficit problem. At best, reductions in Defense spending can contribute to reduced deficits as a minor element within a package dominated by tax increases and reductions in non-defense spending.

The relationship between Defense spending and inflation is a fifth area of relevance to the overall analysis of the linkages between Defense and the economy. When the current Administration's initial Defense spending plans were introduced, the potential impacts of added DoD spending on an inflation rate that was then in the double digit range were among the principal concerns voiced. Today, with the dramatic impacts on inflation of the deepest recession of recent times apparent, the question must be refocused in terms of the potential impacts of Defense spending on renewed inflation. While the current regime of loose fiscal policy in aggregate poses a threat of inflation rates above those prevailing today if sustained as the recovery continues through 1984 and into 1985, the contribution of Defense spending alone to the inflation outlook is modest.

The more important focus is on the impact of inflation on Defense programs. As Table 4 indicates, the improved inflation environment has paid large dividends with respect to the rates of increase in the costs of Defense programs. Based on statistics collected by the Bureau of Economic Analysis, the deflator for Defense programs (excluding the compensation accounts in the DoD budget) has dropped from levels considerably above those prevailing elsewhere in the economy (15.2% in 1980 and 11.7% in 1981) to levels generally consistent with economy-wide experiences. This improvement is forecast to continue during fiscal 1984, with the Defense deflator dropping to 4.6%, a level actually below that projected for the gross national product deflator. This improvement in the inflation outlook has been a major contributor to constraining the current dollar cost of Defense programs. The outlook for 1985 and beyond, however, is less positive, although the Defense deflator is projected to remain well below the lofty levels of the recent past. Three factors are central within this projection: an end to the benefits from deflating energy prices, escalation in the prices of nonferrous metal products central to many Defense programs, and wage settlements within the Defense-supplying industries above those prevailing elsewhere within the economy. As a consequence, inflation will become a more important factor in establishing current dollar Defense budgets in 1985 and beyond than has been the case in fiscal 1984.

A final set of conclusions relates to the impacts of Defense spending across the key industries supplying goods and services to DoD. As was noted earlier in a macroeconomic context, the Defense endmarket has been among the relatively few healthy buyers for many industrial sectors over the past three years. A clear consequence of the recession has been the relaxation of concerns which prevailed earlier regarding the potential for Defense spending induced bottlenecks. The recession has provided a lengthy grace period within which Defense

demands could be accommodated without crowding out private demand or impacting on leadtimes. That grace period continues today, with manufacturing capacity utilization still well below even the 1980 level despite the strong recovery which has occurred during 1983. While any $250 billion enterprise is likely to encounter bottlenecks in isolated instances, the probability of meaningful, economy-wide supply constraints remains low over the next several years. At the same time, however, it remains true that the impacts of sustained increases in Defense spending on the output requirements of numerous industries are large, and few of these industries have invested in their capital bases during the 1980-83 period. The extent of the recovery of business fixed investment during 1984 will be a key factor to monitor in terms of the longer-term ability of U.S. industry to accommodate Defense demands without impacting on other sectors of the economy. In this context, the most important concerns remain within the second and lower tiers of DoD suppliers.

To the extent that a useful summary statement exists across these six key areas of concern, it is that while Defense spending has important and noteable impacts on various dimensions of economic activity, it is in no way a pivotal element within today's economy. Defense spending influences economic growth, employment, inflation, the deficit, and numerous other measures of national economic activity, but does not dominate any of them. The challenge facing Congress and the Administration remains in reality, as philosophically it should, that of determining what levels of Defense activity are necessary to meet our nation's national security objectives.

TABLE 1

CHANGES IN DEFENSE SHARES OF ECONOMIC ACTIVITY

	Defense Share of GNP (%)	Defense Share of Federal Spending (%)	Changes in Real Levels of Defense Spending (%)
1954	13.4	52.9	-15.0
1955	11.6	50.1	-7.4
1956	11.3	49.5	-0.4
1957	11.7	49.5	5.1
1958	11.6	46.5	-1.0
1959	10.7	45.3	-2.3
1960	10.2	43.3	-3.1
1961	10.3	42.7	4.4
1962	10.3	42.6	5.5
1963	9.5	40.1	-3.8
1964	8.6	37.2	-4.9
1965	7.9	35.1	-2.1
1966	8.7	37.5	16.8
1967	9.7	39.6	14.3
1968	9.5	38.6	2.2
1969	8.8	37.0	-5.3
1970	7.8	33.9	-10.7
1971	6.8	30.3	-10.9
1972	6.2	28.9	-3.5
1973	5.4	27.0	-6.6
1974	5.4	25.7	-2.1
1975	5.4	25.0	-0.7
1976	5.0	24.5	-2.2
1977	4.8	24.3	0.7
1978	4.6	23.9	0.4
1979	4.6	24.2	2.6
1980	4.7	24.6	3.9
1981	4.9	25.7	5.2
1982	5.3	27.0	7.0
1983	5.5	28.9	8.0

Source: Data Resources, Inc.

TABLE 2

SECTORAL EMPLOYMENT TO OUTPUT RATIOS

(Thousands of Jobs Per $1 Billion of Output)

Construction	17.1
Finance, Insurance & Real Estate	8.8
Mining	3.4
Transportation & Utilities	9.4
Services	38.2
Wholesale & Retail Trade	28.3
Nondurable Manufacturing	7.4
Durable Manufacturing	12.4

Source: Data Resources, Inc.

TABLE 3

SECTORAL DISTRIBUTION OF PRIVATE NON-AGRICULTURAL PRODUCTION

(Percent)

	Defense Production	Total Production
Construction	5.7	6.7
Finance, Insurance & Real Estate	3.4	15.6
Mining	1.6	1.4
Transportation & Utilities	9.2	9.5
Services	12.1	18.2
Wholesale & Retail Trade	3.6	11.4
Nondurable Manufacturing	8.2	17.8
Durable Manufacturing	56.1	19.4
Total	100.0	100.0

Source: Data Resources, Inc.

TABLE 4
DEFENSE INFLATION
(Annual Rate of Change, Fiscal Year Basis)

	1980	1981	1982	1983	1984	1985	1986
Gross National Product Deflator	8.7	9.7	7.1	4.3	4.8	5.3	5.7
Defense Deflator (Less Compensation)	15.2	11.7	8.4	6.8	4.6	6.3	7.2

Source: Bureau of Economic Analysis for 1980-83 data; Data Resources, Inc. for forecasts

Mr. ASPIN. Thank you very much.

Let me ask you some questions concerning what you were saying about inflation, about the deflator.

You are saying the defense deflator—let me ask you the same question I asked David Chu about the difference between the numbers, the inflation numbers in defense and in the rest of the economy.

Mr. BROWN. First of all, in comparison to the numbers he presented, mine included the impacts of energy prices, so that there are some clear differences in the two sets of statistics.

Mr. ASPIN. You are using a GNP defense deflator?

Mr. BROWN. Yes, one that excludes only the compensation accounts. Mr. Chu talked about the deflator excluding both compensation and energy accounts.

Mr. ASPIN. Your deflator does include energy but not compensation?

Mr. BROWN. Correct. The energy impact is significant, and it points to some of the reasons why I feel defense inflation differs from that elsewhere in the economy.

Let me suggest three factors, using energy as an example, which are true for numerous other components of defense spending.

First of all, the spending mix is different between defense and the economy in aggregate. DOD is roughly twice as energy-intense as is the U.S. economy. Swings in energy prices or costs have a pronounced effect on DOD.

That was particularly true recently and is in fact the principal reason for the higher defense inflation rates of the 1979 through 1982 period. The OPEC II price increases had an adverse effect on DOD inflation.

The second thing that differs is the mix of goods within a generic category like energy. DOD buys specialized fuels for aircraft, ship mobility fuels, et cetera. Typically, the mix in the energy category,

and much more so in the hard goods category, is toward the more specialized high technology ends of the spectrum that have higher prices, and whether the buyer is Defense or otherwise, have had higher inflation rates in recent years.

The third thing that often differs is the way DOD buys goods and services. With energy commodities, they have been typically buying more on the spot market than does the economy in aggregate.

They pay a premium in periods of tight demand and get an extra benefit in periods of slack demand. That difference is in the means of contracting, and the differing contracting methods exist for other goods and services as well. Sometimes it works to the Government's advantage. Sometimes it does not. In 1979 and 1980, it clearly did not. In 1982 and 1983, it clearly has.

I see no reason why the defense deflator should ever be the same as the GNP deflator. There are very clear differences in what DOD buys.

Mr. ASPIN. You are talking about your deflator now?

Mr. BROWN. Any measure of the relevant inflation rate for defense programs.

Mr. ASPIN. Even when leaving out fuel?

Mr. BROWN. Yes. I think leaving out fuel, you have exactly the same thing.

Mr. ASPIN. You explained the difference between the two when you included fuel. Why would Mr. Chu choose the deflator which is different from yours but one that takes out fuel as well as compensation? Why would that be different?

Mr. BROWN. Because the Department of Defense buys a totally different mix of goods and services.

It spends a very high percentage of its money on ships and airplanes; I don't, you don't, the U.S. economy in aggregate does not. If you and I ask what was the right inflation rate for each of us, our personal tastes and preferences really would cause there to be differences in the inflation rate. That is true of DOD, true of in fact any major aggregate. There is an appropriate market basket reflecting the commodities they buy, and defense commodities are particularly different from the commodities bought elsewhere.

Mr. ASPIN. Then the question is, Why are they higher? They might be different, but why do they seem higher?

Mr. BROWN. There are some research results that I feel confident about, but I think there is still work to be done on that subject.

When you look at mix adjusted inflation, the difference between the defense and say the GNP deflator decreases significantly, but it actually is there. The energy example I gave you is one category of such examples.

A second reason for the gap is that the goods and services DOD buys are often far more specialized, with far tighter standards and military specifications for one thing or another. Highly specialized goods that cannot be produced to stock are typically more expensive, whether the buyer is Defense or you or I.

A third element clearly must be contracting procedures. This is one of the areas where there has been a long history of proposed reforms—you mentioned Jack Gansler's conclusions earlier, and the Carlucci initiatives. Many of them deal with contracting proce-

dures. To a certain extent it may be that improved contracting procedures can reduce the gap in that category.

Mr. ASPIN. What bothers me is that when I talk to people, they say there are no problems with bottlenecks. CBO says there is no problem with bottlenecks, Mr. Chu says that, and the BIE study says there are no problems with bottlenecks. Yet it remains true that the defense deflator is higher than the rest of the deflators.

So I say, if there are no bottlenecks, if there is no pressure from defense toward inflation, how can the defense deflator be higher than the other deflator? It might be possible, but it seems counterintuitive.

Mr. BROWN. I think there are certain to be some amounts of the bottlenecks within a $250 billion enterprise somewhere out there.

My fairly strong conclusions that they will not be pervasive in terms of either the economywide impact or the impact on DOD rests most heavily on the fact that the economy is still operating with considerable slack.

It is certainly true that as a sector gets closer to capacity, the pressures on inflation and the pressures on leadtimes tend to go up.

I do not think we are near that in any important defense-supplying sector.

At the same time, the fact that over the last 3 years, Defense has been one of the very few healthy buyers anywhere in the economy, suggests somewhat greater pressures.

Several anecdotes: Among industrial groups that I have spoken with, I have heard of firms doing no defense business in 1980 that have been doing 50 percent of their business for DOD end markets a year ago.

The fact remains that among a long list of weak end markets, DOD has been the one that has had any health in the last several years, so I would expect a little more inflation there than elsewhere, but I still stop well short of saying we are so close to capacity in any important sector to expect the kinds of impact we categorize as bottlenecks or long leadtimes or other such factors.

Mr. ASPIN. In your projections of the defense deflator, you are looking for it to go down to roughly the level or overall GNP deflator?

Mr. BROWN. We are looking, in fiscal year 1984, for the deflator to go down into the mid-4 percent range. There are short-term impacts that are unpredictable, of course.

We are not expecting to see any major pressures on oil prices in the next months, so if there were a significant supply disruption out of the Middle East, that could change. We see it running at roughly the same rate.

Mr. ASPIN. What would that look like if you took fuel out altogether?

Mr. BROWN. If you remove fuel, the deflator would be higher in fiscal year 1983 and fiscal year 1984. There has actually been deflation in the relevant components of energy prices over that period. For fiscal year 1985, energy is almost a neutral effect.

Mr. ASPIN. You would be probably about where you would be in 1985, a little higher in previous years?

Mr. BROWN. If you take the fuel number out, you would have higher inflation in fiscal years 1983 and 1984, and it would be about the same in fiscal year 1985.

Mr. ASPIN. OK. Go ahead.

Mr. MULTOP. Taking a look at your table 4, just to follow up on this, I notice in 1985, you have the defense deflator increasing a full percentage point faster than the GNP deflator and in 1986, that accelerates even further to more than 1½ percent. If energy is not contributing to that——

Mr. BROWN. In 1985. Beyond that, we are seeing above the average rate of inflation for energy prices.

Mr. MULTOP. If there are no bottleneck problems that you are seeing in 1985, and energy is essentially not adding to the inflation rate, why is the defense deflator increasing a full point faster?

Mr. BROWN. There are a long list of explanations. I will cite two that are particularly important.

Almost all statements about inflation have to be put in context of a couple of years ago. We are looking at modest rates of inflation, no return to double-digit inflation rates. So when we say higher rates of inflation, we are talking a couple percentage points, not 15 percent inflation like we saw then.

Nonferrous metal prices are showing higher inflation than most other important sectors of the economy. That will continue. They showed dramatic declines during the recession and are beginning to show some signs of recovery now.

Looking at that industry, you can see considerable financial pressures for some price recovery there.

That impacts on defense programs far more than it does on the economy in aggregate.

A second factor has been the fact that recent wage settlements within several of the defense-supplying industries have been above those elsewhere. In aerospace and in other sectors that have a large impact on defense, there is a positive wage differential contributing to the rate of inflation.

Mr. MULTOP. How do your projections for the defense deflator relative to the overall GNP deflator compare with DOD's? Do you know?

Mr. BROWN. From the statistics cited by Mr. Chu, ours are very similar to his. His were from February. These are more recent projections. There has clearly been a mix of good news and a few spots of bad news in the inflation outlook since then, but they sound very consistent.

I compared them with not only DOD but OMB numbers in the recent past. A great amount of consistency is there in the forecast and in the underlying analysis of why the rates have moved.

Mr. MULTOP. Thank you.

Mr. ASPIN. Questions?

Mr. CLARK. Thank you, Mr. Chairman.

Let me go through this jobs number with you again like we were doing with Mr. Chu.

You have a similar number, 35,000 jobs per billion dollars of defense spending, which I assume is a result of the fact they are using basically your model, though presumably there are some dif-

ferences in what they do. As I understand it, you come out with—you have something like 15,000 direct and indirect jobs.

Mr. BROWN. Yes; approximately 15,000.

Mr. CLARK. For every billion of production, I guess—defense production?

Mr. BROWN. Right.

Mr. CLARK. I think I quote you correctly.

Mr. BROWN. That is correct.

Mr. CLARK. For the total number of jobs, you have 35,000. The 20,000 are what are sometimes called induced jobs?

Mr. BROWN. Induced jobs elsewhere in the economy.

Mr. CLARK. And, as well, some indirect jobs?

Mr. BROWN. Typically what are called indirect jobs are those with parts suppliers that sell to a prime contractor who sells to the DOD. The multiplier jobs are those that——

Mr. CLARK. What people now employed would buy?

Mr. BROWN. Yes, jobs due to newly employed people who buy Cabbage Patch dolls or spend in other segments of the economy on products that don't end up in the DOD end market.

Mr. CLARK. So I have it straight, the 15,000 is——

Mr. BROWN. Is producing goods and services that eventually wind up in the hands of the DOD.

Mr. CLARK. And the 35,000?

Mr. BROWN. Is the aggregate economywide impact in 1983.

Mr. CLARK. Including the 15,000?

Mr. BROWN. That is correct.

Mr. CLARK. 15,000 is direct jobs. The remaining 20,000 is the sum of the so-called indirect plus induced? Are you not using those categories, or what?

Mr. BROWN. The 15,000 is all categories of employment that produce goods and services that end up being delivered to the Department of Defense.

I think by your categorization, you would call that direct plus indirect. The 35,000 is the aggregate impact as the spending works its way through the economy. That is an estimate for 1983, and basically it assumes, as we have observed during 1983, that there was some degree of accommodation on the part of the monetary authorities of the extra spending.

I think the more important thing in terms of looking into the future—because 1983 is largely behind us—is that defense spending in the aggregate is about as labor-intense as most other categories of production. You look at the CBO study with a different basis of measure. And with some differing assumptions going into a slightly different model, you get different numbers. But the constant across the various pieces of research has been the fact that the impacts are not much differentiated between defense spending, other Federal purchases of goods and services, and private purchases of goods and services; they are clearly labor-intense programs—within every category, as a matter of fact—but you shouldn't worry a lot about the differential jobs impact of defense spending decisions.

Mr. CLARK. Just to get it straight, the $1 billion of defense spending excludes the pay and retirement accounts?

Mr. BROWN. Yes.

Mr. CLARK. So we find a significant difference from what CBO finds, but you would like that they wouldn't find any difference in other Federal spending. You have a different absolute number, but it is the same number, whether we talk about defense or any other part of the budget.

Mr. BROWN. It is roughly the same.

Mr. CLARK. Just as they would——

Mr. BROWN. The same for other Federal purchases or private purchases.

Mr. CLARK. But there is a startling difference—I guess I would call it startling—in your conclusion and theirs on the number of jobs just for defense production.

Mr. BROWN. I listened to the earlier discussion, and I felt there were strong points made. I have not studied the comparison in detail, so I can't add much to that.

Mr. CLARK. Thank you.

I do have one more thing on this same question on the impact of adding to or cutting defense. You have a conclusion which we have heard here before many times. That is. if we were to cut defense spending, we would find that the deficit would only decline by half of the amount that we cut. The Secretary testified to that effect a couple of years ago, Secretary Weinberger did. I take it again his testimony is in part based on the use of your models.

Mr. BROWN. That conclusion has also been reached by other analysts using other statistical tools. I think it is a pretty hard number.

Mr. CLARK. On the assumptions behind that, does it not have to be the case that the resources which would be set free by cutting defense spending are not employed elsewhere? Otherwise, if they are employed elsewhere you wouldn't get any effect. I assume the reason we only reduce the deficit by 50 cents for every dollar cut in defense is because we are not going to collect the taxes and so on from the people who are employed, and spending their money. If we don't spend the money, we don't collect the taxes.

Mr. BROWN. If you are in a true full employment economy, many conclusions change. There has to be one-for-one substitution along every dimension if you are at a true full employment economy. A dollar of resources that go to a government program have to come out of a dollar that goes into consumption or some other category.

So I would agree when you reach that situation many of the statistics that I have provided—and I suspect that other people provided—would change somewhat. We are nowhere near that, nor do the prospects suggest that that is going to be a problem for us in the next several years.

Mr. CLARK. Would there be any difference in this case between defense spending and some generalized package of other government spending? Is it not true, we would not cut the deficit by as much as we cut the program in the case of other programs, as well? Is there the same degree of magnitude?

Mr. BROWN. I would see great similarity for other government purchases. I can't tell you whether it is a 2- or 10-percent differential, but I think it would be small.

Mr. CLARK. Minimal. OK. Thank you.

Mr. ASPIN. Secretary Weinberger made distinctions between transfer payments and defense. Do you understand what he was talking about? He thought that, for example, you would get more deficit reduction if you cut transfer payments than if you cut defense, because of the flow-back effect.

Mr. BROWN. I have seen that statistic reported from various sources. I have not done any detailed study of that myself, but I think, looking at not only marginal tax rates but propensities to consume and other factors, that you would theoretically expect that conclusion. I don't have a number as to how big it is, but I would agree with the direction.

Mr. ASPIN. Questions?

Mr. MULTOP. I am not asking for a specific number, but Secretary Weinberger's claims were that when you cut transfer payments, you get almost twice as much impact on deficit as when you cut purchase-type programs. Does that seem in the right ball park to you? I think he was saying something like 95 cents cut in transfer payments comes off the deficit, while only 46 cents of the dollar on defense spending cut.

Mr. BROWN. Yes.

Mr. MULTOP. Does that sound in the right ball park?

Mr. BROWN. It does. You are looking at transfers typically into groups with very low marginal tax brackets—the elderly, the poor. You are looking at categories of spending that have lower multiplier impacts throughout the economy. The typical bundle of goods and services being bought there don't have the high multiplier impacts of durable goods purchases, such as you get out of DOD, for example. I think that is a credible number.

Mr. ASPIN. Explain how the difference occurs on transfer payments. We are talking about a transfer to individuals, I take it.

Mr. BROWN. Right.

Mr. ASPIN. Social security, et cetera?

Mr. BROWN. That is what I was thinking. Some of them go to State and local government, of course.

Mr. ASPIN. Let's take an individual as opposed to a composite DOD cut which would include some payments to individuals in the form of salaries, retirement benefits and other things, and some goods.

Mr. BROWN. In my number, I was not taking some spending out of pay or retirement. I was holding those constant.

Mr. ASPIN. So you are comparing a cut in a——

Mr. BROWN. It is a bit of apples and oranges.

Mr. ASPIN. You are comparing, for example, a cut in a weapons system versus a cut in—I don't know—some payment program, veterans' benefits or social security or AFDC payments; some transfer money.

Mr. BROWN. I was. If you put in the other accounts, pay and retired pay, I would be surprised if there was any distinction—or any way of distinguishing between civilian retired pay and social security or military retirement.

Mr. ASPIN. And the effects have to be exactly the same.

Mr. BROWN. When you put that back in in terms of at least my number, it would move it toward the other.

Mr. ASPIN. Thank you very much, sir. It was very interesting and very helpful.

Mr. BROWN. Thank you.

Mr. ASPIN. Thank you.

We are adjourned.

[Whereupon, at 11:40 a.m., the task force adjourned.]

○

"END OF DOCUMENT"